PROGRESS REPORT

OF

FOREST ADMINISTRATION

IN THE

LOWER PROVINCES OF BENGAL

FOR THE YEAR

1872-73.

BY

W. SCHLICH, PH.D.,

Conservator of Forests, Bengal.

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No. 41, dated Calcutta, the 25th August 1873.

From—Dr. W. SCHLICH, Conservator of Forests, Bengal,

To—The Secretary to the Government of Bengal, Agricultural (Forests) Department.

I HAVE the honor to submit the Annual Administration Report of this Department for the year 1872-73.

2. In accordance with the instructions contained in your letter No. 1667, dated 8th July 1873, I have incorporated the divisional reports of Assam and Chittagong in my report. In the case of Assam I have augmented the material given by Mr. Mann by my own observations, and the general remarks made by Colonel Hopkinson will be found in Section VII. The report of the Chittagong Division, on the other hand, has been inserted under the several sections as received from the Commissioner, and I have restricted myself to a few remarks, owing to my not being acquainted with the forests, and to the absence of data, which would enable me to judge without having seen for myself. The introductory remarks of the Commissioner, giving a short history of the Department in the Chittagong Division, have been kept back for next year's report, when the Department will have been established for 10 years, and when I hope to give the history of all the divisions for that period.

3. The map belonging to Appendix D is now being copied, and will be submitted a few days hence. I should propose that this map may be lithographed, colored, and appended to the report, as I consider it sufficiently instructive to incur the expense. Should this be found impracticable, I shall be obliged to have it copied by hand for the guidance of the officers in Bengal.

4. There is no doubt that the report as a whole is incomplete in many respects, but I trust I shall be able to eliminate from next year's report the greater portion of the defects now unavoidable.

5. As the report, in the ordinary course, will not be in the hands of the officers of the Department until the next season is far advanced, I solicit the favor of being supplied with 14 copies as soon as they leave the press, to be used as a guide in the coming season's work.

6. The divisional reports of Assam and Chittagong are appended for His Honor the Lieutenant-Governor's perusal, and I beg that they may be returned to this office when done with.

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PROGRESS REPORT

OF

FOREST ADMINISTRATION IN BENGAL

For the Year 1872-73.

By W. SCHLICH, Ph.D.,

Conservator of Forests, Bengal.

INTRODUCTORY.

The Forest Department of Bengal has during the year 1872-73 undergone considerable changes. The Conservator of Forests was transferred to the Central Provinces; in December 1872 a new Conservator took charge, and at the same time the executive staff has been raised from six to eleven officers. The Chittagong Division has been separated from the others, and the Commissioner appointed Conservator of Forests. As may be expected, these changes caused, in the first instance, a certain stop in the work, which was followed by a course of action somewhat different from that hitherto observed. The main feature of this change may be said to be of a statistical nature. Hitherto limited data only collected in the forests were available to guide forest officers in the several measures to be taken, whereas the present Conservator's first step was to start an efficient system of collecting detailed information, without which all systems of working are foundationless. The progress made in this direction is as yet small, considering that the work was commenced three months before the close of the year; but in another two years it is expected that a sufficient knowledge of the forests in the different parts of the country will be available, from which a general description of Bengal, from a forest point of view, can be compiled. Until that time arrives it will be advisable to arrange the annual report in the manner hitherto in force.

2. Before proceeding to the record of the work done during the year, it will be necessary to note here the present organization of the department. There are five divisions, which are administered in the following manner:—

First.—Cooch Behar Division, coinciding with the boundaries of the Cooch Behar Commissionership. The forest officers are under the direct orders of the Conservator of Forests.

Second.—Assam Division, coinciding with the boundaries of the Assam Commissionership. The officers are under the orders of the Commissioner of Assam. The Conservator controls the accounts, and has power of inspecting and making suggestions.

Third.—Dacca Division, comprising the forests in Sylhet and Cachar. The forest officer is nominally under the direct orders of the Conservator.

Fourth.—Chittagong Division, comprising the forests in the Chittagong Commissionership. The Commissioner has been gazetted Conservator of Forests, and the Conservator of Forests, Bengal, has no control of any kind over the work. He may be sent on inspection duty, however, with the view of making proposals for the better management of the forests.

Fifth.—Bhaugulpore Division, comprising the whole of the western districts, Chota Nagpore, Patna, and Bhaugulpore.

3. Only in three of the above divisions, namely, Cooch Behar, Assam, and Chittagong, has the administration really been started; whereas little or nothing beyond a very general exploration has been done in the remaining two. For Dacca no officer was available since November last; and Bhaugulpore has been closed in December at the recommendation of the Conservator of Forests, and in order to obtain a sufficient staff of officers for the other divisions.

4. The responsibility for the work in the Cooch Behar Division rests with the Conservator of Forests; in Assam and Chittagong, with the Commissioners of the divisions.

5. The tracts of Bengal in which the Forest Department has been started form only a small portion of the total area. Nothing has been done as yet in the remaining parts. What the extent of forests in Bengal may be is quite unknown at present. An estimate has been made, it appears, giving 59,225 square miles as the area, but this is only an estimate *par excellence*, as the actual area may differ 50 and more per cent. one way or the other. A better estimate can only be arrived at by degrees.

6. During the year further inquiries have been instituted with the view of ascertaining how far the forests meet the requirements of the country as regards timber and fuel. All these confirm the statement made in His Honor the Lieutenant-Governor's resolution on last year's report, to the effect that Bengal is sufficiently supplied with small timbers and firewood with the exception of a portion of the Patna division. But even there no hardship is experienced at present, since large quantities of small building wood are imported from Palamow, and the cow refuse forms a fuel very congenial to the tastes of the people.

7. The people living in the Government forest or its "immediate" vicinity throughout Bengal, ~~except in Sikkim~~, obtain their domestic requirements of forest material free of charge, and they are better off in that respect than the people of most other parts of India.

Section I.

Inspection of Forests.

8. The general inspection of Cooch Behar and Assam has been completed some years ago. The Conservator, however, visited both divisions since his arrival in Bengal, and there are a few remarks which he considers should be recorded under this heading, although some of them may be a repetition of what has been recorded before.

Cooch Behar Division.

9. *Sikkim.*—The Government forests contain the following areas:—

9 plain forests containing	...	...	30·7
21 hill forests ,,	...	...	74·6
		Total ...	105·3 square miles.

These figures do not include a tract of Government forest situated in Daling sub-division, along the east bank of the Teesta, the area of which is not known, and the boundaries of which have not been laid down either on the map or on the ground.

10. The area of Sikkim amounts to 1,234 square miles, its population to 95,224, consequently the proportion of Government reserved forests to total area is 9 per cent., and the area of Government reserved forest per head of population 0·7 acres.

11. The proportion of Government reserved forests is by no means excessive, especially when it is considered that three-fourths of Sikkim are hill territory, where not only firewood is in greater demand than in the Indian plains, but where the forests have also to perform very important duties with regard to the regulation of moisture. In addition, it must be borne in mind that the cultivation of tea occupies a large proportion of the area, and that it evidently will be extended very considerably during the next few years. It is true there are yet extensive areas of forest besides the Government reserved tracts, but tea cultivation has been very successful of late, large additional clearings are made year after year, and, as far as can be judged from experience, the greater portion of the forests outside the reserves, and a few municipal lands, will be converted into tea gardens, or at least into tracts bare of timber forest, in the hills as well as in the adjoining terai.

12. The fabrication of tea requires large quantities of forest material for buildings, charcoal, and tea boxes, hence it is quite certain that the Government forests in Sikkim will become extremely valuable as soon as the material in the private forests will be exhausted, that is to say, after a limited number of years.

13. Whatever may be the functions of forests with regard to the greater or smaller quantity of rain in general, there can be no doubt that the devastation of the Sikkim hill forests will lessen the rainfall and disturb the proper regulation of the moisture. Hill forests, like those of Sikkim, especially when situated at the upper portions of the ranges, will decrease the velocity of the clouds and consequently increase the probability of their coming down in the shape of rain. The chief point, however, is that they prevent the rapid collection of the rain-water in the streams, by retaining a great portion of it and enabling it to sink into the ground, thereby preventing inundations, and reducing the destructive effects of rain-water rushing down steep hill-sides. Moreover, they retard evaporation, and by these actions combined they insure a supply of spring water throughout the year.

14. The opinion of some of the local authorities is that there are too many reserved forests in Sikkim. This view is however not in accordance with the experience gained in other parts of the world. On the continent of Europe, where districts similar to that of Sikkim may be found, it is considered advisable to keep three and four times as high a percentage of land under forest, because it is taken into consideration that these territories have to secure the regular supply of water not only within their own limits, but also to the adjoining plains, sometimes for long distances.

15. If, therefore, all lands now included in the Government reserved forests contained, or were likely to produce, good timber, no part of the area should be given up. The hill forests are all stocked with useful timber, or are capable of producing it, and they should be preserved as they are now fixed. The terai forests, on the other hand, contain areas which neither contain good timber nor is such likely to grow on them. These tracts should be marked off, and they may be given up when the advisability for doing so arises. For some time to come this will not be the case, as of very extensive areas in the hands of private parties only a portion is under cultivation as yet.

16. The forests are much richer in timber of different kinds than it would appear from what is on record at present, and arrangements have been made to

collect detailed information regarding the constitution of each tract. In order to show the forests in a manner easy to understand, they have been classified as follows :—

(1) Sal forest.
(2) Khair and sissu forest.
(3) Mixed plain forest.
(4) Savannah forest.
(5) Lower hill forest.
(6) Upper hill forest (temperate forest).

Under sal forest would come all tracts which contain so much sal that its importance outweighs that of all other trees. Khair and sissu appear usually together, sometimes one and sometimes the other prevailing, and accompanied by small numbers of other trees. This class of forest is found on the banks of watercourses, on ground very little raised above the bed of the rivers and creeks. Mixed plain forest comprises the forests in which neither of the abovementioned trees prevails sufficiently to classify them accordingly, as for instance in the Dulka Jhar reserve. Savannah forest comprises all areas covered with grass, either without trees or containing small numbers here and there. The upper hill forests are the temperate forests, the most characteristic trees of which are oaks, magnolias, chestnut, walnut, lali, maple, &c. Under lower hill forest should be understood the tracts between the plain forests and upper hill forests, and on which the trees of both intermix with each other.

17. The number of species of trees found in the Sikkim forests is very large, especially in the lower hill forest. A beginning has been made towards compiling a complete list, which will be ready next year. The most important trees are the following :—

Sal	*Shorea robusta.*
Toon	*Cedrela toona.*
India-rubber	*Ficus elastica.* *Ficus laccifera.* *Ficus obtusifolia.*
Seet sal	*Dalbergia latifolia.*
Khair	*Acacia catechu.*
Sissu	*Dalbergia sissoo.*
Chelownee	*Gordonia sp.*
Saj	*Terminalia sp.*
Champ	*Mechelia excelsa.*
Lalchamp	*Magnolia Champbelli.*
Acrote	*Inglans regia.*
Katoos	*Castania sp.*
Book	*Quercus lamellosa.*
Phalat	*Quercus annulata.*

A more detailed description of some of the tracts will be found under Section II.

18. *Western Dooars.*—The Julpigoree district, situated at the foot of the Himalayas, is divided into two parts by the river Teesta. The Government forests are all situated in the eastern part—the Western Dooars. The northern boundary of this tract runs along the foot of the hills from the Teesta opposite Sivoke until, to the vicinity of Buxa, where a strip of hill land up to an elevation of about 6,000 feet is taken in ; the boundary then runs to the place where the Sunkos emerges from the hills. On the east the Sunkos forms the boundary, and on the south the Cooch Behar estate. The tract of land thus described is on an average 80 miles long from east to west, and from 25 to 30 miles broad. With the exception of the country around Buxa, the whole district consists of level land intersected by an endless number of watercourses.

19. The hills near Buxa are covered with forest, chiefly or entirely of the class designated as " lower hill forest." They are well stocked, and the trees attain a large size. From the foot of the hills up to the station of Buxa, at

an elevation of about 2,000 feet, thirty-one species of trees were observed, of which the following appear to be the most important:—

Sal	(*Shorea rubusta*)—	Scattered over the forest in fine grown specimens.
Toon	(*Cedrela toona*)—	More numerous than usual.
Burr	{ *Ficus laccifera* / *Ficus obtusifolia* }	—Very numerous, but young trees prevailing.
Chellownee	(*Gordonia sp.*)—	Numerous and in fine large specimens.
Katoos	(*Castania sp.*)—	This tree belongs to the temperate forest.
Katoos	(*Castania sp.*)—	Fruit eaten ; wood good, and used at Buxa for planking.
Champ	(*Michelia sp.*)—	Supposed to be different from the white magnolia of the temperate forest. Wood used extensively.

20. *Forests in the plains.*—The great bulk of the Western Dooars may be described as a grass plain, over which cultivation and forest tracts are scattered. The former is chiefly found in the southern portion, and the latter in the centre and northern part. The forests may be classed as sal forests, khair and sissu forests, and savannah tracts.

21. *Sal Forests.*—The distribution of the sal forests is peculiar, as it depends on the distribution of water. The hills north of the Western Dooars are drained by an endless number of small streams. Many of these, however, disappear, or are considerably reduced in size, just before leaving the hills, as a great portion of the water sinks into the ground. The water thus disappearing all along the foot of the hills is carried south close under the surface, and at a distance of about ten miles, on an average, from the foot of the hills, it appears again in the shape of numerous springs, which keep the lands around them moister than the rest of the area. At the same time the tracts where these springs appear are slightly raised above the general level, whereby a good drainage is secured. The sal forests in the Western Dooars are chiefly found around these springs, that is to say, in moist and at the same time well-drained localities. A good illustration is the Mooraghat forest, situated half-way between the foot of the hills and the southern boundary of the Western Dooars. In this forest the head-waters of the Doodooa are situated, which stream has at the southern end of the forest a current of water in the dry season of about 2 feet deep and 50 feet broad. And again, the mountain torrent which provides the station of Buxa with water disappears entirely about two miles lower down, and it appears again in the Buxa forest some ten miles further.

22. *Khair and Sissu Forests.*—The khair and sissu forests are found as in the Sikkim Terai, along the banks of watercourses; but khair occupies also localities somewhat more elevated, although still close to the streams.

23. *Area of Government open Forests.*—It is not known what the total area of Government open forests in the Western Dooars is. A number of tracts in the plains were declared Government open forests, with sal, sissu, khair, and chellownee as reserved trees. Of the lower hill forests around Buxa none have been declared either reserved or open forest.

24. The following data show the proportion of open forest to total area of the Julpigoree district:—

Area of district in square miles	2,906	
Population	418,018	
Area of Government open forests, 219,227 acres ; or in square miles	342·5	
Proportion of Government open forest to total area of district	12	per cent.
Area of Government open forest per head of population	0·5	acres.

25. The Government open forests in this district have to perform no (or very limited) functions with regard to the regulation of moisture, and their object is exclusively to provide forest material. The western portion of the Julpigoree district is supplied chiefly from the forests in Sikkim and from the

Bycuntpore forest within its own limits. The Western Dooars themselves are very thinly inhabited, and the requirements of the people are very small indeed. On the other hand, timber is much in demand in the districts south of the Dooars, especially in Cooch Behar, Rungpore, and the western part of the Dacca division, to which it can be transported by a number of streams, as the Teesta, Juldaka, Toorsa, and Kalajanee. The supply from the forests in the Western Dooars should therefore be considerably larger than the requirements of the inhabitants within its limits. Considering that the area under cultivation east of the Teesta is only a small portion of the total area, and that immense tracts outside the forests are available for its extension, the percentage of forest land would not appear high. But on examination it has been found that of the area now within forest limits, only a small portion is actually covered with trees, whereas the bulk of the area contains almost nothing but grass. The Mooraghat forest, for instance, which has always been considered as one of the richest, or the richest tract, has been examined in detail by the Conservator of Forests with the following result:—

Sal forest, about	3,800	acres	=	29 per cent.
Grass land with few or no trees, about	9,360	„	=	71 „
Total ..	13,160	„	=	100 „

Judging from these figures, as well as from an inspection of most other important tracts, it is estimated that out of the area demarcated as "Government open forests," only about 20 per cent. are actually forest, and 80 per cent. grass or savannah lands.

26. The lower hill forests around Buxa with their beautiful timber, on the other hand, do not appear to have been taken any notice of in the selection of the Government forests. These tracts are of importance with regard to the regulation of moisture, prevention of land-slips, &c., and a good proportion of their area should be preserved.

27. *Reserved Trees.*—The reserved trees have been badly chosen. Of chellownee there is such a limited quantity in the demarcated tracts, that it was hardly worth while to reserve it. Moreover, it is of value only for local consumption at present, for which no payment is demanded. On the other hand, toon and India-rubber, two trees of the highest importance, have been left out.

28. *Reserves to be Demarcated.*—The plan to be followed, then, would be to select the really valuable tracts in the plains and demarcate them as reserved forests. The total area thus obtainable will not surpass 30,000 acres in all, or about 14 per cent. of the present "Government open forests." After this work has been completed, a portion of the hill forests near Buxa will be demarcated as reserves, say 20,000 acres, so that the total area of Government reserved forests in the Western Dooars would finally stand about as follows:—

Total area of Western Dooars (territory east of Teesta), approximately	1,850	square miles.
Area of Government reserved forests, about ..	80	„ „
Percentage of Government reserved forest to total area of Western Dooars	4·3	per cent.

This area would be less than one-fourth of that of the present "Government open forests."

Assam Division.

29. The Commissionership of Assam, as at present constituted, is bounded on the north by the great Himalayan range, the foot of which forms the boundary line. On the east and south-east it is bounded by a range of mountains running from north to south by south-west as far down as Arracan, and which might be called the Indo-Burmese range. About 60 miles south of, and parallel with, the Himalayan range, a mighty spur runs from the Indo-Burmese range towards the west, which is called, in its eastern portion, the Naga Hills, in the centre Jynteah and Khasi Hills; and in its western part the

Garo Hills. The southern foot of this range forms, generally speaking, the southern boundary. The western boundary is quite artificial, and can only be described as the western boundary of the Kamroop and Khasi Hills districts.

30. The Brahmaputra, after breaking through the Himalayas in the vicinity of the Indo-Burmese range, runs first towards the south-west, and then west, through the whole length of Assam, taking in a large number of feeders of all sizes. On the whole the Commissionership of Assam may be said to comprise the valley of the Brahmaputra for a length of about 400 miles, with a breadth of 80 to 100 miles.

31. The country thus described, with the exception of the tracts occupied by so-called independent hill tribes in the eastern portion, is divided into seven districts of the subjoined dimensions :—

Districts.	Area in square miles.	Inhabitants.	Inhabitants per square mile.	Area under cultivation in square miles.	Percentage of area under cultivation to total area.
Kamroop	3,031	561,681	155	770	21 per cent.
Durrung	3,413	236,009	69	323	9 „
Nowgong	3,648	256,390	70	363	10 „
Seebsaugor	2,413	296,589	123	422	17 „
Luckimpore	3,145	121,267	39	127	4 „
Naga Hills	4,000	68,918	14	200	4 „
Khasi and Jynteah Hills	6,157	141,838	23	50	1 „
Total	27,307	1,682,692	62	2,255	8 per cent.

It will be seen from the above data that only a very small portion, 8 per cent., of the area is under cultivation, whereas 92 per cent. consist of forest, waste land, water, &c. Corresponding with this fact, the population amounts to 62 per square mile.

32. The configuration of Assam must have been originally entirely hilly, with the Himalayas on the north, the Indo-Burmese range on the east, the Naga, Jynteah, and Khasi Hills on the south, and the valley thus formed filled in the lower portion with the waters of the Brahmaputra and its feeders, and perhaps the sea. In course of time deposits were made, and the base of the valley raised, with the exception of the actual watercourses now existing. The physical aspect now presented consists therefore of hill ranges on the north, east, and south, and a plain between, interrupted by isolated small hillocks and little ranges, especially in the Kamroop and Nowgong districts. The Brahmaputra is a fine river, navigable up to the eastern boundary of Assam. It has numerous large feeders, which carry themselves considerable volumes of water; and on the whole the means of water carriage in Assam may be said to be superior to those of perhaps any other part of India.

33. The climate of Assam is damp in the plain and lower hills. The following table gives some data regarding Gowhatty in Lower Assam, Debrooghur in Upper Assam, and Shillong in the Khasi Hills :—

	Elevation above the sea.	Average rainfall during the last two years.	Temperature.			
			Annual mean.	Mean of November to February.	Highest.	Lowest.
Gowhatty	134	63	76	67	...	48
Debrooghur	620	117	73	63	...	...
Shillong	4,825	73	62	53	81	35

The meteorological reports of Bengal unfortunately do not give the data to make the above table complete. It will be observed that the rainfall in Upper Assam is nearly double that of Lower Assam, whereas the temperature is a few degrees higher in the latter. On the southern slope of the Naga, Khasi, and Garo Hills, the rainfall is extremely heavy, amounting to as much as 600 inches at Cherrapunchi.

34. The hills in Assam may on the whole be said to be of a granitic formation, and the chief rock is gneiss. Varieties of other rock appear, but not on an extensive scale. Coal is found on both banks of the Brahmaputra in large layers. The soil in the plains is rich, consisting of loam, sand, and clay—sometimes of a dark color, and sometimes yellow. On the chur lands along the banks of the Brahmaputra, the soil is frequently of a sandy description. In the hills the surface soil, though of similar description, as in the plains, is shallow on the slopes, but still sufficiently deep to yield fair crops of cereals.

35. Of the 92 per cent. of land which are not under cultivation, the greater portion is under forest, and this being as a rule of an evergreen description gives the country an extremely jungly aspect. The character of the forest in different parts of the country, and under different circumstances, changes considerably. Up to the present the country which is drained by the feeders on the Brahmaputra has been examined, whereas little or nothing is known regarding the forests on the southern slopes of the Naga and Khasi Hills. The following remarks refer, therefore, only to the valley of the Brahmaputra.

36. The number of species of timber-trees found in Assam is extremely large, and in attempting to classify the forests at this moment great difficulties present themselves, as some of the classes resemble each other considerably, although essentially different in many points. The following classification should be considered as a preliminary attempt, to be replaced hereafter by a more distinct description, based on a more detailed knowledge of the forests than is at present available. The forests in Assam then may be divided into the following classes:—

1*st*.—Sal forest.
2*nd*.—Mixed plain forest.
3*rd*.—Soom forest.
4*th*.—Savannah forest.
5*th*.—Lower hill forest.
6*th*.—Pine forest.
7*th*.—Upper hill forest.

37. The first five classes of forest have a large number of trees in common, but they contain each some particular species which distinguishes them. The sal forests contain, of course, chiefly sal. The mixed plain forest and soom forest are, properly speaking, only different in so far that mixed plain forest which contains soom has been called "soom forest;" in all other respects they are perfectly alike. Savannah forest means grass land with trees scattered over it. The lower hill forest differs from the mixed plain forest chiefly in that the former is rich in bamboos, whereas the latter is poor in them. Moreover, the mixed plain forest is evergreen, whereas the lower hill forest contains according to circumstances, in a higher or lesser degree, deciduous trees, including sal. The pine forests are formed by *Pinus khasya*, and the upper hill forests contain chiefly temperate trees. It will no doubt cause surprise that the so-called caoutchouc forests have not been specially enumerated. The reason is, that there are no real caoutchouc forests as such, the India-rubber trees being scattered generally "in single trees" over the lower hill forests, mixed plain forests, soom forests, and even sal and savannah forests. During his late tour in Assam, the Conservator has never met them more frequently than at the rate of one per mile within 50 yards on either side of the road, or 20 trees per square mile at the utmost.

38. The mixed plain, soom, and savannah forests are found in the plains, the sal forest partly in the plains and partly in the lower hills, the lower hill forests from the foot of the hills to an elevation of about 3,000 feet, the pine

forests from 2,400 to 6,000 feet, and the upper hill forests above 4,500 feet elevation.

39. In Appendix A the more conspicuous trees found in the Assam forests have been enumerated. Of these 29 species have been declared reserved trees, and of these again the following are the more valuable kinds for timber :—

1*st*.—Sal	*Shorea robusta.*
2*nd*.—Sam	*Artocarpus chaplasha.*
3*rd*.—Ajhar	*Lagerstroemia regina.*
4*th*.—Nahor	*Mesua ferrea.*
5*th*.—Poma	*Cedrela toona.*
6*th*.—Titasappa	*Michelia champacca.*
7*th*.—Hurjamu	*Engenia jumbolana.*
8*th*.—Burjamu	„ *mangifolia.*
9*th*.—Gunseroi	*Camphora glandulifera.*
10*th*.—Gomari	*Gmelina arborea.*
11*th*.—Uriam	*Bishopia Javanica.*
12*th*.—Bola	*Marlea sp.*
13*th*.—Koroi	*Albizzia odoratissima.*
14*th*.—Sonari	*Cassia fistula.*

The uses of sal need not be dwelt upon here. Sam is used chiefly for boats, and also for planking; ajhar, for boats and building purposes; nahor, chiefly for posts; poma, for furniture, planking, and tea boxes; titasappa, for boats and furniture; the two species of jamu for building purposes; the rest for the generality of local requirements.

40. The original distribution of the different classes of forest may be described in the following manner:—

Sal Forest.—In Sikkim, the sal forests are found on the lower hills up to 3,000 feet, and in the adjoining plains forming a strip running along the outskirts of the Himalayas. This strip runs through the Western Dooars to the Eastern Dooars, and on approaching Kamroop it becomes of smaller extent, running on to the Durrung district, on the eastern boundary of which it disappears entirely. And again a similar strip of sal-bearing forest runs along the foot and lower part of the northern portion of the Garo and Khasi Hills, and the adjoining parts of Kamroop district, first broad and rich in sal, but in running on to the Nowgong district becoming narrower and poorer as it proceeds towards the east, and dying away near the eastern boundary of Nowgong, almost opposite the eastern limit of the Durrung district. Sal forest is found, therefore, in the Kamroop, Nowgong, and Durrung districts, and along the lower portion of the Garo and Khasi Hills.

Mixed Plain Forest.—This evergreen forest is found in Kamroop, north and south of the Brahmaputra, in patches of greater or lesser extent, and a strip along its northern boundary. Proceeding to the Durrung district, the strip extends into a belt in the same degree as the sal forest disappears. This belt, ranging from 5 to 30 miles in breadth, runs through the Durrung district to the Luckimpore district, up to and round its eastern limits to the Naga Hills near Jaipore, then it fills the greater portion of South Luckimpore and of Seebsaugor. In the eastern portion of Nowgong it forms the Nambor forest, and thence towards Kamroop it runs out into detached blocks scattered over the country.

Where sald isappears in the east of Durrung and Nowgong, naturally grown soom appears, going on increasing in proceeding towards the east. This tree appears always in patches usually of small extent and only exceptionally covering one square mile or more, but within these it is almost always pure. Soom forest then means patches of soom scattered over evergreen mixed plain forest.

Savannah Forest.—The space between the Brahmaputra and the belt of mixed plain forest is, generally speaking, filled up by savannah tracts, in which the cotton tree is conspicuous. The " chur" lands on the banks of the Brahmaputra are likewise occupied by savannah or grass only.

Lower Hill Forest.—This forest occupies the lower hills up to 3,000 feet along the whole northern slope of the Garo, Khasi, and Naga Hills, except where sal prevails to such an extent as to render the tract a sal forest.

Pine forest has been observed in the Khasi and Western Naga Hills, where it is found in the greater portion of the country between 3,000 and 5,000 feet, going down however to 2,400 feet and up to about 6,000 feet. The eastern limit of this class of forest is not known.

41. The mixed plain and soom forests are almost always fully stocked—in fact dense, and very moist. Many of the trees attain a good size. Their most valuable timber is ajhar, sam, and jamu. India-rubber attains a large size in it. A great portion of this forest is under water during the height of the rains. Soom forest is exactly the same as mixed plain forest with the addition of soom. In the lower hill forest the trees attain a finer shape than in mixed plain forest, and its chief timbers are sal, sam, nahor, poma, and tita sappa. The finest India-rubber trees are found here. Unfortunately the greater portion of these forests is continually joomed, whereby their value has been greatly reduced.

42. The sal forests must have been much more extensive in former years than they are now, the present forests representing only what has been left by jooming.

43. The same may be said of the pine forests, which have disappeared from vast areas by the combined effects of jooming and fires. In fact real pine forests are now the exceptoin in the Khasi Hills, whereas the sides formerly occupied by them are covered with grass either without trees or with a very thin sprinkling of them. In a few localities, as for instance in the Kakri valley, magnificent forests are still existing, containing trees with clear stems to 70 feet, but even these are evidently decreasing year after year, owing to the improvident way in which they are treated.

44. The upper hill or temperate forests in the Khasi Hills are found in patches only, especially near watercourses or springs. These patches are in themselves well stocked, but the trees are much inferior in size and stature to those of the temperate forests in Sikkim.

45. Regarding the areas occupied by the different classes of forest, our knowledge is very limited as yet. An estimate has been made by Mr. Mann, the Assistant Conservator who examined the greater portion of Assam, the results of which are subjoined:—

	Sq. miles.	
Kamroop District.		
North of the Brahmaputra	72	
South ditto	50	
	——	122
Durrung District.		
Kaling Boru, Gooma, Koreepara Dooars ...	40	
Chardooar	220	
Nandooar	200	
Chydooar	125	
	——	585
Nowgong District.		
Total area		120
Naga Hill District.		
Total area...		888
Seebsaugor District.		
Forest without soom	250	
Ditto with soom	100	
	——	350
Luckimpore District.		
North of Brahmaputra	940	
Ditto ditto with soom	150	
South of Brahmaputra	1,360	
Ditto ditto with soom	50	
	——	2,500
Grand Total ...		4,565

The foregoing statement does not comprise the savannah tracts. Of the forests in the Khasi Hills no estimate has been attempted.

46. *Inspection of the Jynteah Hill Forests.*—An officer was deputed to examine these forests in August and September 1872. It appears that the greater portion of them has been considerably reduced by jooming. The examination has been, however, of a very general kind; and before we come to any conclusion regarding the value and management of the forests, it will be necessary to institute further and more precise inquiries.

Dacca Division.

47. The present year has added nothing to our knowledge of the forests of this division.

Chittagong Division.

48. The Commissioner and Conservator of Chittagong writes as follows:—

"In the first year of inspection, Mr. Davis inspected the forests between the junction of the Soobalong and Kurnafoolee, as far as Bellasurree, a distance of about 22 miles, and the tract between Kassalong and Khurkorea, about 35 miles, as well as the forests bordering on the Kassalong between those places and those along the Kurnafoolee as far as the Burkhul Falls. He reported the cuttings that have been carried on during past years have told very much on these forests, and timber is very scarce in places where it has been easy to get out, the borders of streams being entirely denuded; whilst further inland, where the woodman has not been able to get out a log, the boat-digger or sawyer has taken his place, and everywhere the most valuable trees have been taken out, whilst the more abundant and fast growing kinds, such as gurjun, are still plentiful. Toon has been nearly eradicated, and other kinds of valuable woods have only just been saved in time. Had unlimited cutting continued for five years longer, I venture to say, mature jarool, chaplis, and woods of a similar class would not have been found in the forests bordering on the Kurnafoolee or Kassalong rivers.

49. "In the year 1871-72, Mr. Davis explored the forests on the Kurnafoolee river and its tributaries, the Renkeong, Soobalong, Kassalong, and Myanee, and also between the Burkhul and Demagiri ranges. His linear valuation surveys showed the existence of considerable quantities of the valuable kinds of timber in the tracts. These surveys extended along 44 miles of forest, equal to an area of 331 acres, in which 750 first class, 695 second class, 1,113 third class trees, and 5,783 saplings, were counted."

50. The inspection made by the Assistant Conservator in the year of report will appear from the following paragraphs quoted *in extenso* from his report:—

"During last cold season the forests on the river Kurnafoolee and its tributaries, Kassalong, Myanee, Soobalong, and Renkeong, were visited and reported on in the last annual report, leaving unknown the resources of the different rivers in the south of the district and the Fenny in the north. Of these, this year those in the south have all been visited, and in addition the forests in the Sillock.

51. "Before moving south, the forests on the Sillock had to be visited and examined with a view to ascertaining their value in regard to the forest produce leases that have been given. There are four blocks, and known as lots Nos. 2, 3, 27, and 28, and comprise about 10,000 acres. Three of them, 2, 27, and 28, are held under settlement by one individual, on an annual rental of Rs. 600. Lot No. 3 was this year applied for by the same party, but a portion of it falling within boundaries given for plough cultivation no settlement was given.

52. "These tracts were visited by me twice during the season, first in November and again in December. The object of the first visit was to test old surveys of the blocks and obtain some idea of their position and contents; on the last, to commence survey of a new lot for which the same party had applied for a 'forest produce lease.' I found the previously surveyed lots fairly correct, considering the heavy jungle through which the survey had to pass in some places. The value of the forests had to be considered from two points—

the timber and their other products, and the means that exist for bringing such to market. Though these forests do not contain sufficient valuable timber-trees to justify my recommending their being reserved, nevertheless there is a fair supply of inferior wood, such as gurjun, jam, and baddee, with a few of the better kinds, dispersed amongst them, and this, leaving out other minor produce, would admit of an assessment far higher than is at present paid, especially as the situation adds considerably to the value of the blocks, which have the Kurnafoolee on one side, and the Silok on another, at no great distance, and the Chittagong market within 25 miles by water. That portion that is nearest the Kurnafoolee can at any time of the year send its produce to market; but it is not so with the Silok side, as this river can only be used for floating during the rains, and hence it is that the sun 'kholas' on its immediate vicinity are of comparatively little value, owing to the sun-grass not being fit to cut before the river falls. The large number of gurjun trees yield a fair return in supplying gurjun-oil, for which each man that taps the trees has to pay the lessees Rs. 2 to 5 per annum. In addition to the above, these tracts produce bamboos, canes, and occasionally dug-out canoes are made in them. Taking all things into consideration, I am of opinion that a fair appraisement would be eight annas per acre, and would recommend, that on expiry of the present lease the lots should be put up to auction, and the right of collecting tax be sold with the above at an upset price.

53. "The survey of the lot applied for this year has been completed, but there is a doubt about the land being situated in the regulation district.

54. "Of the rivers in the south, the first visited by me was the 'Htursa,' up which stream I went as far as the 'Kemee Kheong,' occupying seven days in getting up. The whole of the country has been joomed, and I do not think it possible to bring out more than three or four hundred trees. Nothing in the shape of a forest is now to be seen. From the number of logs lying in the bed of the stream, it would appear that formerly a large quantity of timber was floated down, but that owing to scarcity of water in the stream many logs were abandoned. Other causes may have likewise contributed to their being left where they are, such as the rafts and lashings smashing by the freshes coming down suddenly. On the jooms many trees are to be seen lying and rotting, having been felled solely to avoid their shading the crop. Many of these logs are still of value, and I consider it should be made imperative for them to be brought out before any more living trees are felled.

55. "After returning down the 'Htursa,' I proceeded up the 'Sungoo' to Modhookhong. The stream has sufficient water as far as Tinchee to admit of canoes of about 80 maunds going up; but beyond Tinchee it is full of rapids, and at and above Thendoo the bed is nearly blocked up with immense boulders, and it is remarkable that from this point the stock of valuable timber-trees increases in the same ratio as the difficulty of getting the timber to a market increases, and probably for the same reason. There is another cause to which the richness of the forests here may be attributed, and that is, that the Mughs do not joom in this remote locality for fear of the wild tribes, and the few jooms that there are, are those of the Kumees and Mroos.

56. "From Modhoo I left the Sungoo and marched across to the Kolladyne and back, taking three days going and returning. My motives for going were, first, to ascertain the comparative values of the forest in the different districts; and secondly, to ascertain whether the teak or caoutchouc-trees grew in this direction. With regard to their comparative values, those on the Kolladyne side were far superior in point of stock, whilst in value they are simply without any market; and this alone will account for the existence of so much timber, whereas the great demand and consumption in Chittagong has reduced our forests partly to their present state, and I have doubt but that our forests were originally as well stocked, and that natural reproduction has not been able to keep pace with the constant jooming and cutting. There is no difference whatever in the kinds of timber-trees of the two districts.

57. "On returning from the Kolladyne, I retraced a portion of my way along the Sungoo to Tinchee, and from there struck across the Yamboug Tong,

and descended into the 'Llama,' following its course to where it empties itself into the Matamoree. From the summit of Yamboug a magnificent view of the surrounding country and forests can be had, comprising at a glance many miles of country showing clearly the various timber-clad parts and jooms, conveying a far better idea generally of the contents of the forests and their distribution over the country than it would be possible to obtain by passing through only portions of it. To travel over the whole country, if possible, would take years.

58. "On the Llama there is very little timber of any value, and the river bed a little above Thung Lowen Roa is one mass of boulders and utterly impossible for boats or rafts.

59. "Up the Matamoree, I went eight days' journey beyond its junction with the Llama, and after passing the Lagada, on the fourth day got into fair timber country, and obtained valuation surveys in one or two places, where the features of the country admitted of such; but as a rule there is great difficulty in holding valuation surveys in these hills. Owing to the dense under-growth it is a matter of considerable trouble to get into most places, and when once in it is very often impossible to get out, except at the spot where you enter. The hills being mostly broken and their sides being precipitous, it is impossible to get out by descending elsewhere, and the only course is to find an elephant track, but this again frequently only leads through bamboos and grass jungle. Putting all these natural obstructions aside, the branches and leaves of the trees in the forests interlace so much, it is difficult to say to which trunk they belong, and the matter of distance from the line of survey has to be decided purely by guess-work, as it is very often impossible to get near enough to the tree, either to measure the distance or its circumference; so that, on the whole, I am inclined to think that these linear surveys are calculated more to mislead than to give any accurate idea of stock in mixed hill forests.

60. "After exploring the Matamoree valley to the utmost extent possible, I crossed over the Mraing Tong range and marched along the Phalaing Kheong, following its bed to where it joins the Pawah or Bagkhallie, and then to Gurjunia and Ramoo. The country drained by the Bagkhallie is nearly destitute of valuable timber, the whole of it having been cleared away by jooming. From many of the peaks and ranges along the line of march the whole of the country lying below could be seen, and both old and new jooms were distinctly discernible, covering nearly the whole country.

61. "From Ramoo I returned to my standing camp at Chundergonah by the sea-face, having been away sixty days and over 400 miles. To sum up briefly, it will be seen that owing to heavy cutting to supply the market and to admit of jooming, our forests have been cleared away, and we have only two left of any value, one on the Sungoo commencing at Thendoo, and the other on the Matamoree beyond the Lagada. A glance at the maps of the district will show the remoteness of these localities, and it will then be understood, further on, why I condemn the idea of forming reserves."

Patna.

62. The Patna, Shahabad, and Gya districts, forming the southern half of the Patna Commissionership, have been visited during the year by the Conservator of Forests. The soil in these districts is mostly of alluvial origin, except where rocks crop out, which latter consist of metamorphic formations, chiefly gneiss. The area of these districts, with the exception of a fringe of land adjoining the Palamow sub-division, is occupied by cultivation, interrupted by groves of trees here and there. These, usually called mangoe groves, are mostly arranged round the villages. Besides the groves, trees have been planted extensively in all larger stations and along road-sides. The species met with are chiefly the following:—

Am (mango)	*Mangifera Indica.*
Imli (tamarind)	*Tamarindus Indica.*
Several kinds of palm-trees.	
Several species of fig-trees, as—	
Bar	*Ficus Bengalensis.*
Pipli	*Ficus religiosa.*

Pakkar	.. .. ..	*Ficus rumphii.*
Guler	.. .. ..	*Ficus lencocarpa.*
Sirris ..	.. .. ..	*Albizzia sp.*
Babul ..	.. .. ..	*Acacia Arabica.*
Sissu ..	.. .. ..	*Dalhergia sissoo.*
Nim ..	.. .. ..	*Melia azadirachta.*
Agas ..	.. .. ..	*Alelia azedarach.*
Bel ..	.. .. ..	*Aeyle marmelos.*
Ber ..	.. .. ..	*Zizyphus jujuba.*
Toon ..	.. .. ..	*Cedrela toona.*
Mahua	.. .. ..	*Bassia latifolia.*
Karanji	.. .. ..	*Pongamia glabra.*
Paras ..	.. .. ..	*Butea frondosa.*
Jamun	.. .. ..	*Engenia jumbolana.*
Lesura..	.. .. ..	*Cordia mixa.*
	&c.,	&c.

An estimate of the area occupied by groves or trees generally is not available, but it is only a small portion of the total. The fringe of jungle or forest land in the south-west of the Gya and Shahabad districts appears to be of a description similar to that on the adjoining portion of Palamow, which will be described further on.

63. Of exotic trees, there are three kinds which demand attention. Teak is found at Bankipore, Arrah, Gya, Sherghotty, on the road between Gya and Sherghotty, and on the Grand Trunk Road from Sherghotty towards Burhee, about four miles from the former place. Of mahogany there are several trees at Bankipore, and of *Ficus elastica*, one specimen has been found at the same place.

64. The abovementioned trees are partly prized on account of their fruit, and the wood of all of them is used for domestic purposes. Exported is only mango wood in the shape of opium chests, for which purpose several hundreds of tons are required per year. Large timber is imported, the sal coming from Nepal and partly from Palamow, and teak from Burmah. Small timber and timber of inferior quality is derived from the trees growing in the districts, and imported in large quantities from Palamow. The latter is usually of a girth averaging 2 feet, and from 12 to 15 feet in length. It is cut in the forests situated in the north of Palamow, and dragged and carted far into the Gya district. Bamboos are imported in moderate quantities in the same manner. The chief supply of bamboos for Gya, Patna, and Shahabad, however, is cut in the forests situated in the south-east of Palamow, and floated down the Koel, Soane, and Ganges rivers, as far as the town of Patna.

65. Wood fuel is not available in sufficient quantities; it is used in the southern parts of Gya and Shahabad to a good extent, but over the greater portion of the area dried cow-refuse is the material principally used. At present this state of affairs does apparently not indicate a hardship, as the custom of burning cow-refuse is very old, and as the people seem to prefer it to wood: indeed, the Conservator has seen the former used in localities where wood fuel was to be had within a few hundred yards. Another question, however, is whether it will not become a hardship. Agriculture is progressing, and the failure of the opium crops has of late called for a searching investigation as to its causes. If it should be found that one of them is the exhaustion of the ground, cow-refuse will have to be applied to its legitimate use to manure, and the want of fuel will then be deeply felt. But, even apart from the opium question, the time will come when cow-dung will be used for the manuring of all lands under cultivation, and the question of providing fuel will have to be considered.

66. The Patna division is the chief source of opium, and the amount of revenue derived from it by Government, as far as that district is concerned, must be some four millions of pounds. The cultivation of the drug occupies of course large areas, which cease to be available for the local requirements of the people. Moreover, the ryot or zemindar obtains only a portion of the profit derivable from the sale of the opium, whereas the greater portion of it goes to the State. If, therefore, any district in India is entitled to look forward to Government for measures to prevent a dearth of fuel and timber for local purposes, it is the Patna division.

67. At present the great difficulty is to obtain land, as almost none belongs to Government. Moreover, the returns from cultivation are high, and it would require a considerable outlay of money to buy blocks for forest purposes where they are most required. In the vicinity of Sherghotty land of an inferior quality seems to be obtainable. There are some tracts of waste land on both sides of the Grand Trunk Road towards Burhee which are now covered with low jungle, chiefly of asan (*Terminalia tomentosa*), khair (*Acacia catechu*), and sakwa-sal (*Shorea robusta*). The soil is of a dry and sandy description, and the jungle now growing on it does not look promising. But, on the other hand, this is explained by the fact that every shoot fit to yield a rafter is immediately cut down for local use, and moreover the trees planted along the Grand Trunk Road show very fair growth. I am of opinion, therefore, that trees will do fairly well on the tracts under consideration. The owners of the land are said to be the following zemindars:—Sheik Nassar Ali, Narkoo Sing, and Sooamar Sing. When the question of plantations in Behar is seriously taken up, it will be necessary to institute a more detailed examination of the districts than has been practicable during the past season.

Palamow.

68. Palamow consists of the broken ground formed by the spurs running from the Chota Nagpore plateau towards the Gangetic plain. There are chiefly two ranges of hills to be noted, one running from the southernmost point in a north-westerly direction, near the south-west boundary of the pergunnah towards the Soane, and a second coming from the Hazareebaugh district and running parallel with the former, near the north-east boundary. From these ranges an endless number of spurs radiate, and in addition isolated hills and small ranges are found which, with the intervening valleys, produce the broken and hilly character of the country.

69. The two rivers which drain Palamow are the Koel and Kunhur. The latter forms the south-western boundary of the district, and as a range of hills runs immediately to the north-east of it, the area thus drained is but small. The Koel, on the other hand, runs right through the centre, from the south-eastern boundary to the Soane on the north, thus draining almost the whole of the country. It has two main feeders, the Amanut and Aurunga. With the exception of an obstruction near the village of Sigsigi (easy to remove), the Koel is open for timber-floating operations from its junction with the Aurunga, about 9 miles above Daltongunj, down to the Soane. Above that point it is obstructed by boulders and rocks. No reliable data are available regarding the Amanut.

70. The rock in the north-western half of the pergunnah from Daltongunj to the Soane is said to be chiefly sandstone. The substratum of the south-eastern half is gneiss, which appears on the surface in large blocks on all the upper ranges and on steep slopes. On the undulating ground the gneiss is covered by lateritic formations, by ferruginous clay and loam.

71. Palamow, like most other countries, was originally covered with forest, which has given way to cultivation in the more favorable parts. With the exception of the level portions, however, the jungly aspect has nowhere been removed, and, as a rule, limited blocks of cultivated land (amounting to one-eighth of the total area) are imbedded in extensive tracts of jungle and forest. The composition of the latter differs according to elevation and other circumstances. In Appendix B the trees observed have been enumerated. This list comprises 71 species; but there is no doubt that the actual number will, on a more detailed examination, be found near 100, although most of the important trees have been mentioned.

72. Almost all the trees enumerated are found under all the different conditions in the pergunnah; but if the greater or lesser frequency is taken into account, three distinct classes of forest or jungle may be formed, namely—

1. Lower mixed forest.
2. Sal forest.
3. Upper mixed forest.

The most characteristic trees of the lower mixed forest are—

Khair	...	...	*Acacia catechu.*
Paras	...	...	*Butea frondosa.*
Asan	...	...	*Terminalia tomentosa.*
Ber	...	...	*Zizyphus jujuba.*

In the sal forest the proportion of sal is so great that all other species become comparatively unimportant. Of the latter the following are chiefly characteristic:—

Piar	...	...	*Buchanania latifolia.*
Belawa	...	...	*Semecarpus anacordium.*

The upper mixed forest contains the greatest number of species, of which the following are most characteristic:—

Salai	...	...	*Boswellia thurifera.*
Thauta	...	...	*Anogeissus latifolia.*
Gamhar	...	...	*Gmelina arborea.*
Then	...	...	?
Kien	...	...	*Diospyros tomentosa.*
Garohan	...	...	*Soymida febrifuga.*
Guler	...	...	*Ficus lencocarpa.*
Ginyan	...	...	*Odina wodier.*
Kusum	...	...	*Scheichera trijuga.*
Galgal	...	...	*Cochlospermum gossypium.*
Bans (bamboo)	...	...	*Bambusa stricta.*

73. The distribution of the forests may be described in the following manner. The lower mixed forest occupies the lower portion of the area up to an elevation of about 1,000 feet. The upper mixed forest appears always where rocks appear in large masses on the surface, that is to say, on the upper part of the ranges and on steep slopes. The sal forest appears, generally speaking, between the two, that is to say, it occupies the undulating ground down to where the lower mixed forest begins. There is however a territorial limit to the appearance of sal forest. It is, according to report, not found north of Daltongunj. Between Sherghotty and Daltongunj the Conservator has observed none, except one small patch near the bank of the Amanut. In proceeding from Daltongunj towards Barasand, the first sal forest found is situated near Hurnomand, distant 21 miles, and at an elevation of about 1,000 feet. From this place it occupies all the undulating ground up to Barasand, and down again close to Latiahar, at an elevation of about 800 feet, in approaching which place it disappears gradually, being replaced by lower mixed forest. The latter continues for about 15 miles until the ground begins to rise again towards the Chota Nagpore plateau, where sal forest appears again, covering the undulating ground as far as Hazareebaugh. It appears thus that the north-western limit of the natural sal forests in Palamow is indicated by a line drawn from Hurnomand in a north-easterly direction on one side and a north-westerly direction on the other.

74. Taking the forests as a whole, the following are the trees found in the largest numbers:—

Khair ...	...	...	*Acacia catechu.*
Sal ...	...	...	*Shorea robusta.*
Paras ...	...	...	*Butea frondosa.*
Salai ...	...	...	*Boswellia thurifera.*
Asan ...	...	...	*Terminalia tomentosa.*
Mahua	...	...	*Bassia latifolia.*
Sida ...	...	...	*Lagerstræmia parviflora.*
Ber ...	...	...	*Zizyphus jujuba.*
Beri ...	...	...	*Casearia tomentosa.*

and the several species of *Ficus.*

75. The forest products of Palamow are very numerous, and the Conservator confines himself to mentioning the more important articles. As timber, sal takes the first place. It is used for an endless variety of purposes. Next comes kusum (*Scheichera trijuga*), an extremely hard wood, used for rice-pounders, oil-presses, sugarcane-crushers, &c.; kien (*Diospyros tomentosa*), a kind of ebony; thauta (*Anogeissus latifolia*); kahua (*Terminalia glabra*); asan (*Terminalia*

tomentosa); then (?) ; sida (*Lagerstræmia parviflora*) ; karam (*Nauclear cordifolia*) ; imli (*Tumarindus Indica*); gamhar (*Gmelina arborea*); bel (*Aegle marmelos*); ginyan (*Odina wodier*) ; piar (*Buchanania latifolia*); persar (*Cassia fistula*); and bans, or bamboos, are prized above others for domestic purposes.

76. The export of timber is chiefly of three different kinds. Large sal timber is transported from the forests around Barasand, partly by land and partly by water, down the Koel to Dehree, for the Soane canal works; secondly, small timber averaging in girth 2 feet and in length 12 to 15 feet, as well as bamboos, are carried from the range on the north-east into the Gya district; thirdly, very large quantities of bamboos are cut in the forests around Barasand, and transported down the Koel to the Shahabad, Patna, and Gya districts. Nothing is known regarding the quantities exported per year.

77. The mahua (*Bassia latifolia*) is found in large numbers all over the district, and enormous quantities of the flowers are collected for food and for the preparation of spirit. Ber (*Zizyphus jujuba*) is also found over extensive areas, and its fruit is collected for food.

78. Catechu is extracted from the wood of khair (*Acacia catechu*). The amount prepared annually is estimated at 3,500 maunds, but there are some doubts regarding the correctness of this estimate. The tussur silk-worm feeds on the leaves of the asan (*Terminalia tomentosa*), and it is estimated that from eight to ten lakhs of cocoons are collected yearly, which, as a rule, find their way to Mirzapore and Benares. The right to collect catechu and silk, known in Palamow as "koa kuth," is leased out annually ; and during the year 1872-73 it realised Rs. 1,130. The produce thus sold is about two-thirds of the total outturn, the remaining one-third being the property of jaghirdars.

79. The lac insect appears on three species of trees in large quantities, namely, kusum (*Scheichera trijuga*), paras (*Butea frondosa*), and pipur (*Ficus religiosa*), especially on the two former. About 5,400 maunds are said to be collected annually, but Government derives no revenue from it at present.

80. Resin, or dhuna, is collected from the sal tree, for which purpose the largest trees are killed. The amount of resin collected per annum is supposed to be some 300 maunds. No revenue is derived from this source.

81. Bullocks and cows graze free of charge on the Government lands. For buffaloes a payment of three annas per head has to be made. The returns to Government up to date have been very small, for want of control.

82. The lower mixed forest contains no middle-sized or large trees whatsoever except those preserved for the fruits' sake; as for instance mahua (*Bassia latifolia*), and here and there a few useless as timber. This condition has been brought about by the following circumstances:—

1*st.*—Cutting for local use and for export.

2*nd.*—Cutting of khair (*Acacia catechu*) for the fabrication of cutch or catechu.

3*rd.*—Jooming. For this purpose large areas are cut every year as soon as the shoots or trees are a few years old. In most cases the jungle of a large tract is collected on a comparatively small spot, which is cultivated after the wood has been burnt. In this manner the jungle on at least 5 to 10 acres is cut for the purpose of cultivating one acre of land.

83. In the upper mixed forest, large and mature timber is still found in the more removed tracts. Near the lines of communication and along the border of the Gya district, no (or very little) large timber is found, except such as is useless. In some parts jooming is carried on, but the areas fit for it are limited.

84. All the more accessible sal forests have been worked out some time ago, and they contain now hardly anything but shoots from old stumps, of a girth up to one and a half or two feet at the utmost. Seedlings are extremely rare, simply owing to the fact that there are no seed-giving trees. Some less accessible sal forests, chiefly in the vicinity of Barasand, contain still a little mature

timber, but very few living large trees. The Conservator, on his journey from Daltongunj to Barasand and Latiahar, passed through sal forests extending over a length of 34 miles, and he is quite sure that he has not seen, as far as the eye could reach on either side, a hundred living sal trees of five feet girth and upwards. Dead trees of considerable girth are more frequent, and from a spot between Garoo and Sirjoo the Conservator counted 130 large dead sal trees within a circle of about half-a-mile. These trees have almost all been killed for the sake of the resin, to obtain which they were girdled. From inquiries it appears that the value of the resin obtainable from a full-grown tree is about half an anna, and for such a trifle perhaps 50 to 100 cubic feet of timber are sacrified. After another few years there will not be a single large sal tree found alive, and natural reproduction will be completely stopped for want of seed. Jooming is carried on to a good extent in sal forests, and some of the old trees have been killed by the cultivators' fires.

85. A portion of the old timber has been removed for the Soane Canal works; it is carted some 20 to 25 miles along a rough and difficult road, or rather track, to the junction of the Koel and Aurunga, whence it is floated to the Soane. The timber now lying on the banks of the Koel is all unsound, almost all the pieces being hollow, or at least diseased, in the centre. The Conservator is not in a position to explain this fact to a certainty, but he thinks the unsoundness is due—

1*st.*—To excessive jungle fires during the infancy of the trees.

2*nd.*—Excessive tapping for resin.

3*rd.*—It is believed that the trees now remaining are those which were originally inferior than the rest, all the better trees having been cut and removed first.

4*th.*—It is not unlikely that the Public Works contractors have removed the trees found in the more accessible places, whereas better trees may still be available in more remote spots.

86. Young trees, or shoots from old stumps, are cut in large numbers, wherever available, for domestic purposes including firewood; in fact, in some parts the people burn nothing but young shoots of sal, of which they keep always a good supply near their houses.

87. The Palamow district is very favorable for the growth of sal. There are still sufficient proofs to show the excellence of the timber formerly produced. The measurement of a few old trees is as follows:—

1*st.*—Between Cheepadohur and Hurree, a tree of 8 feet in girth at 4 feet from the ground.

2*nd.*—Between Hurree and Barasand, a tree of 5 feet 3 inches girth, and a bole almost perfectly straight and regular up to 60 feet.

3*rd.*—Between Barasand and Garoo, a tree of 10 feet 10 inches girth, and a bole 45 feet long, quite straight, and apparently perfectly sound.

4*th.*—In the same place, another tree of 11 feet 6 inches girth; the latter is divided at 7 feet from the ground into two branches, each of which showed a girth of 6 feet, and a straight and sound bole about 30 feet long.

5*th.*—Between Garoo and Sirjoo, a tree of 8 feet 3 inches girth, and a bole 40 feet long, a beauty in shape, perfectly straight and sound.

Considering that these trees are surrounded by extensive tracts of small sal, there is no doubt that excellent sal forests can be produced by protecting certain areas against cutting and fires. If this is done, seedlings will spring up as soon as seed becomes available, and in the meantime fair sized timber will be produced from the shoots of the old stumps. Of the latter there can be no doubt, as here and there shoots are found which have escaped the axe, and grown into fairly promising young trees.

88. Twenty-eight blocks of land in Palamow have been set aside for forest purposes. The subjoined statement gives an abstract of the areas:—

Name of Tuppah.	Area in Acres.
1. Bari	... 25,812
2. Seemah	... 25,079
3. Barasand	... 24,016
4. Khami	... 7,406
5. Doorjag	... 13,174
6. Punday	... 17,688
7. Kote	... 822
Total	... 113,997 acres,

or 178·12 square miles. These tracts are all situated in the southern half of Palamow, that is to say, in the sal district. As soon as the revenue survey sheets become available, the forests will be marked off, and a detailed list of the areas prepared.

89. In comparing the area of these tracts with the total area and the number of inhabitants, the following data are obtained:—

Area of Palamow	4,260 square miles.
Population	366,519
Area of Government forest tracts, 113,997 acres, or	178·12 square miles.
Proportion of Government forest tracts to total area	4 per cent.
Area of Government forest tracts per head of population	·3 acres.

The area under cultivation in Palamow amounts, roughly estimated, to about 15 per cent. of the total area; whereas 85 per cent. are jungle and forests or waste. The extent of the Government forest tracts is therefore small.

90. The Government forests set aside contain the three different classes of forest described above, but it is not known in what proportion. The Conservator has passed through several of the blocks, and he found that they present the same conditions as the remaining jungle lands, that is to say, they are in the same reduced condition. At present only a small portion of the total area of the pergunnah is under cultivation, but it appears that a steady tide of immigration has set in, and that cultivation is rapidly extending. Considering that the forests have been exhausted already, there can be little doubt that forest material will become scarce, even in a country like Palamow, if the population continues to increase. It will be necessary, therefore, to bring the forest blocks under regular management, and proposals to that effect are now before Government.

Hazareebaugh.

91. The Conservator's tour through a portion of this district was very rapid. From what he has seen it appears that the geological formation, as well as the forests, resemble those of the southern half of Palamow. The upper hill ranges consist chiefly of gneiss, and on the undulating ground the surface consists of ferruginous loam and clay. Upper mixed forests cover the hill ranges and steep slopes, and sal forests the undulating ground. Of lower mixed forest he has seen very little, which is explained by the fact that the Hazareebaugh district may be said, generally speaking, to be situated at an elevation of about 2,000 feet above the sea.

92. The chief object of the short tour through the district was to obtain some information regarding the question whether sal will grow large in it. The forests of sal consist throughout of shoots from old stumps, which are constantly cut over as soon as they are fit for local purposes. Moreover, the people burn almost nothing but young sal shoots a few inches in circumference. In some places on tracts of limited extent the shoots are allowed to reach a somewhat larger girth, and whenever such is the case they grow up into promising young trees; but even in these cases they fall under the axe before they reach a girth of three feet.

93. On the march from Latiahar on the Palamow frontier to Hazareebaugh, a small number of really large sal trees is met with, which proves what excellent timber may be produced if certain tracts are protected against cutting. The village of Balumath is surrounded for miles by sal, containing only small shoots; but near the opium factory is a small grove of trees which has been protected against cutting, and of which the Conservator has taken measurement, thus obtaining the following results :—

Number.	Girth at four feet above the ground.	Length of bole.	Estimated cubical contents of bole.	Remarks.
1	9′ 11″	25′	125	Straight.
2	6′ 6″	35′	52	Ditto.
3	17′ 7″	6′	176	Badly shaped, divided into branches at 6 feet from the ground. One branch shows girth 10 feet; length of bole 15 feet.
4	18′ 3″	40	250	Falling off considerably in girth in upper part. Stem knotty, owing to former large branches.
5	7′ 8″	20′	45	Above 20 feet divided into two branches.
6	7′ 2″	30′	60	Straight.
7	6′ 11″	30′	45	Ditto.
8	5′ 10″	35′	35	Ditto.
9	5′ 0″	45′	36	Ditto.
10	4′ 1″	50′	25	Ditto.
11	4′ 5″	30′	20	Ditto.
12	4′ 2″	45′	22	Ditto.
13	4′ 3″	40′	20	Ditto.
14	3′ 4″	50′	15	Ditto.
15	4′ 6″	40′	22	Ditto.
16	3′ 10″	45′	18	Ditto.
17	3′ 7″	45′	15	Ditto.
18	5′ 8″	40′	40	Ditto.
19	5′ 10″	40′	42	Ditto.
20	8′ 4″	6′	35	Divided into two branches at 6 feet from the ground, each branch 3 feet 6 inches girth, and boles of 10 feet and 25 feet long respectively.
21	4′ 10″	30′	24	Straight.
22	5′ 1″	35′	30	Ditto.
23	6′ 0″	20′	28	Nearly straight.
24	5′ 8″	35′	35	Straight.
25	8′ 3″	11′	54	Divided into three branches at 11 feet from the ground. The branches give two boles 3 feet 6 inches in girth and 10 feet long each.
27	6′ 1″	25′	35	Straight.
26	8′ 0″	28′	60	Ditto.
28	9′ 1″	....	....	Divided at 7 feet into two branches; no good boles.
29	6′ 8″	40′	60	Straight.
30	3′ 7″	30′	12	Ditto.
31	4′ 7″	35′	24	Ditto.
32	4′ 1″	35′	18	Ditto.
33	4′ 5″	35′	22	Ditto.
34	4′ 7″	40′	27	Ditto.
35	7′ 1″	15′	44	At 15 feet divided into two branches, giving two small boles of 3 and 4 feet girth and 15 feet long.
36	8′ 8″	30′	80	Straight.
36	....	....	1,651	
Average per tree		..	45 9	

These 36 trees stand on an area of exactly one acre, which they occupy only partly in company with a number of other trees. If the area was completely stocked, it would contain at least 60 trees with a content of timber amounting to 2,752 cubic feet.

94. At a village called Jareo, four miles east of Balumath, another grove similar to that at the latter place is found, of which, however, no measurement

has been taken. Between Tandwa and Chipa, near a village called Koteway, the Conservator found on the edge of a sal forest of the usual reduced description, one large tree of 6 feet 10 inches girth with a bole of 30 feet, yielding a good piece of timber. This tree has been preserved either by accident, or more likely to afford shade to cattle and men, the land around it being under cultivation. A portion of the latter had evidently been lying fallow for one year, and on it were found a large number of sal seedlings, about 12 inches in height, grouped around the old tree, thus proving the facility of natural reproduction of sal if not interfered with. Near the village of Banandar, three miles west of Hazareebaugh, one old sal tree of six feet in girth was found in a grove, the village being surrounded by sal forest of the usual description.

95. The above data show that it rests entirely with us to produce large sal timber in the Hazareebaugh district. The present forests consist all of shoots from old stocks, and the absence of seedlings is due to the absence of seed-giving trees. It is true that sal begins very early to flower, but it appears that the seed produced by very young trees is not capable of germinating, a circumstance common to most timber trees (teak is one of those which makes an exception of this rule).

Sunderbuns.

96. The question whether the forest produce extracted from the Sunderbuns should be subjected to a royalty has been before the Government for some time. In order to obtain some information regarding the forests, Mr. A. L. Home, Deputy Conservator of Forests, was despatched to examine them during the last working season.

97. The northernmost portions of the Sunderbuns have partly been leased out and partly are held in fee simple. These tracts may be said to form a strip of land between the settled country and the Government Sunderbun forests. The latter consist of the following areas:—

In the 24-Pergunnahs	...	...	1,723 square miles.
„ Jessore district	...	...	1,266 „
Backergunge	...	...	29 „
	Total	...	3,018 square miles.

Mr. Home had visited the tracts in the 24-Pergunnahs and a portion of those in the Jessore district, when, owing to one of the laborers being carried off by a tiger in broad daylight, and in the immediate presence of the whole working party and of Mr. Home himself, the men struck work, forcing him to return. At the same time the season was so far advanced that a new expedition could not be organized.

98. The Sunderbuns, it appears, are covered with dense and, in almost every case, impenetrable undergrowth of goran (*Ceriops Roxburghiana*) from six to twelve feet high, mixed with seedlings and saplings of the larger trees noted in Appendix C prepared by Mr. Home. Over this undergrowth a more or less thick growth of mature trees is scattered, and the whole is frequently intermixed with heavy creepers, which in many cases attain a girth of ten to fifteen inches, crushing down the young trees on which they rest. In some parts clumps of hartal (a palm) forms the undergrowth, which attains occasionally a height of sixteen to twenty feet.

99. The trees, it appears, do not attain a great size, five feet girth being exceptional, and the maximum height being fifty feet. Most or all the trees are used for firewood, and many, especially,—

Soondree	*Heritiera littoralis*,
Gengwa	*Excœcaria agallocha*,
Bani	*Avicennia tomentosa*,
Keowra	*Sonneratia apetala*,
Kolsha	*Aegiceras corniculata*,
Poshoor or pussur	*Carapa obovata*,
Shingr	*Cynometra bijuga*,

for building and other purposes. The most important of these is soondree, a scented, durable, and tough wood. It is cut in lengths from eight to twenty-five feet, and used for beams, buggy shafts, planks, boat-building, paddles, posts, and furniture, occasionally for masts and rudders. This tree is found of good size, in the compartments east of the Arpungasee, which forms the boundary between the 24-Pergunnahs and Jessore, whereas only trees of stunted growth are found west of that river.

100. Regarding the quantity of growing material, Mr. Home shows that the forests in the 24-Pergunnahs examined by him contain the following quantities of the seven best kinds of trees:—

Mature trees	5 per acre.
Middle sized	177 ,,
Saplings	896 ,,

No opportunities for ascertaining the rate of growth presented themselves, but the men employed in wood-cutting, and others, estimate the time necessary for the reproduction of soondree poles of fifteen to twenty-four inches circumference at eight to ten years. Assuming that twenty years are required to reproduce the forests in their present condition, then the area available per year for cutting would amount to 3,018÷20=151, or in a round figure, 150 square miles, containing the following material:—

Mature trees	480,000
Middle sized	16,992,000
Total ...	17,472,000 trees,

which in weight would give, at the very least, 20,000,000 maunds of serviceable material, without counting the saplings at all.

101. It has been found impossible to ascertain the actual quantities removed annually. Those which passed the canals and those transported by the railway are given at 8,278,464 maunds. As this is the supply of Calcutta and the adjoining district, the total quantity is not likely to reach 15,000,000 maunds, and under the circumstances it appears that the Sunderbuns will be well able to furnish the present outturn without any special interference. From this the soondree tree should be exempted, however, as we have not sufficient data to judge of the quantities available. Great quantities are said to grow in the more eastern compartments not visited by Mr. Home.

102. The question to be dealt with is therefore, for the present, of a financial nature only, that is to say, to raise a revenue. For this purpose Mr. Home proposes to establish about 25 toll-stations, situated so that the boats must pass one or the other in going and coming. Wood-cutters proceeding down take out a license by paying at a fixed rate, according to the size of the boat and the kind of produce they intend to bring out. On the return journey they have to give up the license at whatever station they pass, and a release receipt would be given to them to enable their passing other stations. The stations chosen, it will be observed, are situated north of the blocks leased out and held in fee simple, consequently Mr. Home proposes that the owners of the latter should be forced to issue passes to any wood-cutters who cut in their lots. It appears that there are great difficulties in putting the licensing stations outside the leased blocks, as there is neither sweet water obtainable, nor are provisions to be got except from long distances. Mr. Home makes no proposal regarding the amount of royalty to be levied, but he mentions the rates in force when the forests were leased to the Port Canning Company, which were as follows:—

Timber of all kinds ...	Rs. 8 per 100 maunds.
Firewood	,, 2 ,, ,,
Thatching materials ...	As. 12 ,, ,,
Shells for lime	Rs. 4 ,, ,,

The effect produced by this tax on the price of firewood in Calcutta in 1867-68 amounted to 10 to 18 per cent. of the previous price. At the present moment the price of firewood ranges from Rs. 8 to 33 per 100 maunds, or about Rs. 20 on the average. This is equivalent to about three annas two pies per maund. A royalty of Rs. 2 per 100 maunds would add a little less than four

pies per maund, or about 10 per cent. of the present sale price. From personal inquiries in the Calcutta bazars, it appears that the small consumer has usually to pay from six to eight annas per maund, owing to the fact that the fuel passes through several middlemen, instead of being bought direct from the larger depôts.

103. It will rest with the Government to decide whether a royalty is to be levied from the forest produce in the Sunderbuns, and if decided in the affirmative, a system similar to that proposed by Mr. Home might be introduced. The rate to be levied, however, should be uniform, and Re. 1-8 per 100 maunds of produce of whatever description may be found adequate. This would bring in a revenue of at least Rs. 1,75,000. The establishment necessary for the eighteen stations proposed by Mr. Home would involve a cost of Rs. 2,883. To this the cost of several additional stations in Jessore and the allowances to officers must be added, making on the whole an expenditure of, say, Rs. 4,000 per month, or Rs. 48,000 per year, and leaving a surplus of Rs. 1,27,000. If the uniform rate was fixed at Rs. 2 per 100 maunds, the net revenue would come to close on two lakhs of rupees.

SECTION II.

Reserves.

104. The area of reserved forests in Bengal has been given in the Inspector-General of Forests' last yearly report as 1,546 square miles. The Conservator of Forests is not aware how this figure has been obtained; at any rate such an area of reserved tracts does not exist. On the 1st April 1872 the total area amounted to 105·3 square miles, all situated in Sikkim. During the year under review an addition of 214¼ square miles was made in Assam, and 342½ square miles more have been selected in Assam and the Western Dooars, but not yet gazetted.

Cooch Behar.

105. *Sikkim.*—The reserves were gazetted as such in 1865, but up to the beginning of this year neither the exact areas had been ascertained, nor were maps available. From the atlas sheets in the Deputy Commissioner's office it has been ascertained during the year that the area of the reserves in Sikkim amounts to 105·3 square miles, exclusively of a tract of country in Daling, the area of which could not be ascertained. The Conservator immediately after taking charge drew up detailed instructions, according to which the several tracts should be examined, and Mr. Gamble commenced the work on the 24th January 1873 in the Mahanuddy terai range. Up to the end of the working season he has examined 8,404 acres, and as this work, though not quite complete, may serve as a sample to other officers, the Conservator has appended it in full to this report as Appendix D, restricting himself here to the following extract.

106. The area examined is covered as follows:—

With sal forest	4,705	acres.
,, khair and sissu forest	895	,,
,, mixed plain forest	270	,,
,, savannah forest	2,534	,,
Total ...	8,404	acres.

The range is bounded on the north by the Darjeeling hill territory; on the west by the Darjeeling cart road; on the east by the Teesta river; and on the south by tea estates, other cultivated land, and the Bycuntpore forest belonging to the Rajah of Julpigoree. It forms, therefore, a strip of land about nine miles long and one-half to two miles broad, running along the foot of the hills. The surrounding people have no rights in the forests. A few small villages have been established inside at the pleasure of the forest authorities, the inhabitants of which are allowed to cultivate small areas in the savannah

tracts. The outlets for timber are the Mahanuddy to Silligoree and thence to the Ganges, and the Teesta to Julpigoree and to the Brahmaputra. The more valuable timber trees are the following:—

In the sal forests—

Sal	*Shorea robusta.*
Chalownee	*Gordonia Wallichii.*
Saj	*Terminalia glabra.*
Sitsal	*Dalbergia latifolia.*
Toon	*Cedrela toona.*

In the khair and sissu forest—

Sissu	*Dalbergia sissoo.*
Khair	*Acacia Catechu.*

In the mixed plain forest—

Sal	*Shorea robusta.*
Toon	*Cedrela toona.*
Saj	*Terminalia glabra.*
Chalownee	*Gordonia Wallichii.*
Katoos	*Castanea sp.*
India-rubber tree	*Ficus elastica* and *obtusifolia.*

The quantity of growing material is calculated as follows:—

Name of Tree.	Trees Available.				
	2-3 cubits 3' to 4' 6" girth. Young trees.	3-4 cubits 4'6" to 6' girth. Trees.	Above 4 cubits Above 6' girth. Old trees.	Mature.	Seedling.
Sal	27,814	5,360	734	.....	.....
Chalownee	320	177	214	.....	.....
Saj	1,340	867	530	.....	.....
Sitsal	85	24	.....	.....	.....
Toon	47	43	28	.....	.....
Katoos	185	43	28	.....	.....
Sissu	1,825	297	17	.....	.....
Khair	2,499	170	.....	.....	.....
India-rubber	.....	.....	.....	14	71
Total	34,115	6,981	1,551	14	71
Grand total of timber trees ...	.....	42,647	.....	.....	.....

The seedlings and saplings under 3 feet girth are very numerous, especially those of sal.

107. This work will be continued next season in the Mahanuddy hill range adjoining the terai range, and when that has been examined a working plan for the two ranges together will be drawn up.

108. *Western Dooars.*—In the Western Dooars the selection of reserves has been commenced in the Mooraghat forests by Messrs. Fisher and Johnstone, the junior assistants who arrived in December last. They were introduced to the work by the Conservator personally, but owing to the season being so far advanced, not much work could be done. They demarcated, surveyed, and mapped, however, six blocks, comprising sal forest ... 3,168 acres.

Khair and sissu forest ... ... 1,300 ,,

Total ... 4,468 acres=6·98 square miles, which it is expected will now be gazetted as reserves. A description of them will be given after this has been done, and the work will be continued in the Buxa forest.

Assam.

109. During the year seven reserves have been gazetted, and four more selected, which it is hoped will be gazetted shortly. The former are the following:—

Name of District.	Name of reserve.	Sal forest.	Mixed plain and lower hill forest.	Total.
		Area in square miles.		
Kamroop	Pantan	12	... ..	12
Ditto	Bordooar ...	23	.....	23
Ditto	Matiakar ...	3½	...	3½
Nowgong	Kolahaut ...	7½	.....	7½
Ditto	Deboka	3½	... ..	3½
Ditto	Mikkir Hill ...	.....	65	65
Naga Hill and Seebsaugor districts	Nambor	.....	100	100
	Total ...	49½	165	2'4½

110. The sal reserves are all situated in the sal-bearing tract described in Section I as running along the lower part and foot of the northern slope of the Garo, Khasi, and Jynteah Hills. The following is a short description of the tracts:—

Pantan Reserve—

1. *Area.*—12 square miles.

2. *Boundaries.—East*, the Kulsi; *south*, the Bherbhery and Lamkarpara Beels, the Kulsi, its feeder the Dorun, the village of Ookiam, the Bokola Dooar Nuddy; *west* and *north-west*, the Bokoladooar, the Dungai Doonga, the village of Gunga Dooar, Jolookbary and Bokara Bora, the Danga Dooar.

3. *Topographical description.*—Low detached hills on the left bank of the Kulsi, immediately below where it leaves the Khasi Hills.

4. *Soil.*—Sandy loam and clay of good quality, resting on a granitic substratum.

5. *Forest.*—Chiefly sal of healthy and vigorous growth and of all sizes. Of other trees the following should be mentioned:—

Sam	*Artocarpus chaplasha*	Both in small numbers.
Poma	*Cedrela toona*	
Koroi	*Albizzia odoratissima.*	

Jooming has been carried on to a small extent only.

6. *Timber depôts.*—None at present, but a depôt is to be established lower down on the Kulsi, reachable by Dacca boats.

7. *Timber markets.*—Gowhatty, Goalpara, Dacca.

8. *Lines of export.*—Down the Kulsi to the Brahmaputra (both excellent for floating) to Dacca.

9. *Villages within the forest.*—None.

10. *Rights of surrounding population.*—None. The people are amply provided for from the surrounding open forests.

The materials for a working plan of this reserve as well as the others are not yet complete. They will be added next year. Maps on a scale of two inches to the mile, taken from the topographical and revenue surveys, exist.

Bordooar Reserve—

1. *Area.*—23 square miles.

2. *Boundaries.—North*, the paddy fields of Miagaon, Tea Maripara, Aluba, and Chowtolla; *east*, paddy lands of Borsola, Ghagoria Chock, Ghernabaree, Panjamie, and Jopungbaree, a feeder of the Moira Nuddy, the Moira Nuddy, Lower Assam Company's estate, village of Kamvanga, the Chucko Khal, and pathway to Boluntporee; *south*, the villages of Boluntporee and Rajapara, the Kulsi Khal; *west*, the Kulsi River.

3. *Topographical description.*—Low detached hills with level ground between them.

4. *Soil.*—On the hills, sandy loam on granitic substratum; on the level ground, somewhat more sandy, with a great deal of vegetable mould. Quality good, especially on the level ground.

5. *Forest.*—The southern chiefly level portion contains perhaps the best sal forest in Assam, whereas the northern hilly portion has suffered from jooming; the western portions towards the Kulsi have been extensively worked by the Lower Assam Tea Company, to whom the tract belonged for some years. The growth of sal on the whole is good.

6. *Timber depôts.*—None at present, but one to be established on the Kulsi.

7. *Timber markets.*—Gowhatty, Goalpara, Dacca.

8. *Lines of export.*—Down the Kulsi on the west, and down the Bata Nuddy on the east, both to the Brahamaputra, and all good for floating, to Dacca.

9. *Villages within forest.*—None.

10. *Rights of surrounding population.*—None. The people are provided for from the open forests.

Matiakar Reserve—

1. *Area.*—3½ square miles.

2. *Boundaries.*—*West*, the Bata Nuddy, the village of Pookapampura, Lower Assam Company's estate, the village of Nokaree, and a large *beel* at the foot of the Deemabeelparbut; *north* and *north-west*, a small feeder which falls into the last mentioned *beel*, then a line to the top of the Deemabeel, thence the Umthoma; *south-east* and *south*, the foot of hills in the valley of the Umsura, the villages of Kenapara and Bandapara, the Bata Nuddy.

3. *Topographical description.*—An outer northern spur of the Khasi Hills, known as Lemphi Range. The ridge is narrow, and the slopes very steep.

4. *Soil.*—Sandy loam of fair quality, with granitic substratum.

5. *Forest.*—Well stocked chiefly with sal, but a great portion of the mature trees have been removed. Other useful trees are—

Koroi	...	...	*Albizzia odoratissima.*
Parellee	...	...	*Bignonia chelonoides.*
Bun-am	...	...	*Mangifera sylvatica.*

6. *Timber depôts.*—None at present, but one to be established on the Kulsi.

7. *Timber markets.*—Gowhatty, Goalpara, Dacca.

8. *Lines of export.*—Down the Bata Nuddy, which is fit for floating during the greater portion of the year, to the Kulsi and Brahmaputra to Dacca.

9. *Villages within the forest.*—None.

10. *Rights of surrounding population.*—None. The people are provided for from the surrounding open forests.

Kolahaut Reserve—

1. *Area.*—7½ square miles.

2. *Boundaries.*—*North*, the grants Khola (No. 46) and Amjaric (No. 47), both resumed by Government, and the Khola Mouza; *east*, Khola Mouza; *south*, the foot of the Khasi Hills and the Kolahaut River; *west*, the trunk road.

3. *Topographical description.*—Level ground situated immediately at the foot of the Jynteah Hills.

4. *Soil.*—Alluvial deposit consisting chiefly of sand with a fair admixture of vegetable mould.

5. *Forest.*—Almost exclusively sal of good growth, but all young, there being no trees of four feet six inches in girth and upwards. The larger trees have all been removed by the Public Works Department for the bridges on the trunk road. In the westerly portion the trees are scattered only, and close to Kolahaut a small portion is grass land.

6. *Timber depôts.*—None.

7. *Timber markets.*—The greater portion of the timber will always be required for the bridges on the trunk road, and the rest for Gowhatty and Nowgong.

8. *Lines of export.*—Trunk road to Gowhatty and Nowgong. Down the Deemal, Kullung, and Brahmaputra, to Gowhatty, Goalpara, and Dacca.

9. *Villages within the forest.*—None.

10. *Rights of surrounding population.*—None. The people are provided for from the surrounding open forests.

Deboka Reserve—

1. *Area.*—3¼ square miles.

2. *Boundaries.—North*, the foot of the Mikir Hills; *east*, the Gangadasee River, the Dikbaroo River; *south*, the Jamoona River, old survey line of the former Government reserve, No. 229, from Mikirgaon up to the Mikir Hills; *west*, the foot of the Mikir Hills.

3. *Topographical description.*—Level ground situated at the foot of the Mikir Hills.

4. *Soil.*—Alluvial deposits in the neighbourhood of the Jamoona, Dikbaroo, and Gungadassee Rivers, and ferruginous clay at the foot of the Mikir Hills.

5. *Forest.*—In the north-western portion chiefly sal of good growth; in the eastern and south-eastern part the sal is mixed with other trees, and intersected by grass lands. There are no trees of 6 feet girth and above, and only a limited number between 4 feet 6 inches and 6 feet, the forest having been worked excessively for the Nowgong market.

6. *Timber depôts.*—None.

7. *Timber markets.*—Nowgong.

8. *Lines of export.*—Down the Jamoonah, which is good for floating, to the Kopilee, Kullung, and Brahmaputra, to Gowhatty, Goalpara, and Dacca.

9. *Villages within the forest.*—None.

10. *Rights of surrounding population.*—None. The people are provided for from the surrounding open forests.

A limited number of surveys have been made in the reserves, but the Conservator does not consider them to represent the average contents of material, and he prefers not to put the figures on record.

111. The remaining two reserves are covered with mixed plain and lower hill forest without sal.

Mikir Hill Reserve—

1. *Area.*—65 square miles.

2. *Boundaries.—North*, the Lungkung Tung, the Faimoi Joorie, a line along the ridge from the former to a feeder of the Borpung, the Borpung, a line from the source of the Borpung along the crest of the ridge between the Borpung and Bor-Deopanie rivers; *east*, a feeder of the Tareepung, and the Tareepung; *south*. Kallianee; *west*, the Manie Joorie, a line from the source of of the Manie Joorie to the source of the Lungkung Tung.

3. *Topographical description.*—Low hills with steep slopes in most parts, situated immediately on the north bank of the Kollianee River.

4. *Soil.*—Shallow, sandy clay on granitic rock.

5. *Forest.*—Dense evergreen forest, in which the following are the better kinds of trees:—

Nahor	... ...	*Mesua ferrea.*
Gunseroi	... ...	*Camphora glandulifera.*
Jamu	... ...	*Eugenia jambolana.*
Sam	... ...	*Artocarpus chaplasha.*
Tita sappa	... ...	*Michelia champacca.*
Uriam	... ...	*Bishopia Javanica.*
Poma	... ...	*Cedrela toona.*

A kind of cinnamon, "tezpat," is common, the leaves and bark of which are used as spice.

Jooming is carried on to a very large extent in the Mikir Hills generally, and the reserve is nearly the only tract left which has not been seriously injured by it. The forest in its present state contains a good proportion of mature trees.

6. *Timber depôts.*—There is a depôt at Golaghat on the Dhunsiri River, but it has been closed lately.

7. *Timber markets.*—There is at present very little demand for the timber growing in this class of forest, except for large trees for dugouts, or boats for use on the Brahmaputtra and its feeders.

8. *Lines of export.*—Dragging to the Kallianee, and floating down that river to the Dhunsiri and Brahmaputra.

9. *Villages within the forest.*—One small village consisting of nine houses is situated in the reserve; but as the Mikirs change the site of their villages every second year, it is expected that they will be persuaded to move outside the boundaries of the reserve.

10. *Rights of surrounding population.*—None. The people are amply provided for from the surrounding open forests.

Nambor Reserve—

1. *Area.*—100 square miles.

2. *Boundaries.*—*North*, the Turajan Nuddy and a line from it to the "Doigurung;" *east*, the Doyang River; *south*, the Bor Holonijan and the road between Borpattar and Jamaguri; *west*, the foot of the eastern slopes of the Rengmah Naga Hills and the Doigurang River.

3. *Topographical description.*—Almost entirely level ground, comprising the land on the banks of the Doigurung, Dunsiri, and Doyang Rivers.

4. *Soil.*—Chiefly alluvial deposits with vegetable mould.

5. *Forest.*—Mixed plain and lower hill forest, well stocked with trees of all sizes, except perhaps along the banks of the rivers, where timber has been cut and removed to some extent. The better kinds of timber are:—

Ajhar	...	...	...	*Lagerstræmia reginæ.*
Nahor	...	...	...	*Mesua ferrea.*
Poma	...	...	...	*Cedrela toona.*
Hulluk	...	...	...	*Terminalia bicolorata.*
Sam	...	...	...	*Artocarpus champlasha.*

6. *Timber depôts.*—Golaghat, 8 miles below the junction of the Dunsiri and Doyang Rivers, but at present closed.

7. *Timber markets.*—Golaghat, and tea estates in its vicinity. The requirements of the Public Works Department are drawn from this forest; also boats for use on the Brahmaputra and its feeders.

8. *Lines of export.*—Down the Dunsiri and Doyang, excellent for floating, to the Brahmaputra.

9. *Villages within the forest.*—None.

10. *Rights of surrounding population.*—None. The people are amply provided for from the surrounding open forests.

112. The sal reserves will return a fair amount of revenue at once; but from the Mikir Hill and Nambor reserves only very small returns can be expected at present, as the timber they contain is not sufficiently valuable to stand a long transport. The demand will largely increase, however, as the open forests become exhausted and cultivation, especially of tea, increases.

113. The reserves will now have to be permanently demarcated, and the sal reserves examined in detail, with the view of framing simple working plans for them.

114. The reserves selected, but not yet gazetted, are the following:—

	Square miles.
KAMROOP—	
Kulsi plantation reserve	5½
DURRUNG DISTRICT—	
Kalingduar	6
Balipara	70
Nanduar	54
Total ..	135½
Add caoutchouc reserve ..	200
Grand Total ..	335½

115. During the next season the Jeerung forest and other sal tracts in Kamroop and Nowgong will be examined, and further reserves selected. In the Seebsaugor district the selection of reserves of mixed plain and lower hill forest is to be taken in hand.

Chittagong.

116. No reserves have been created in Chittagong, and the Commissioner writes on the subject as follows:—

"The following reserved tracts were proposed to be notified:—

"No. I.—*The Kassalong Reserve* (area 875 square miles).—*North*, Hill Tipperah and Cachar; *south*, the Karnafoolee River from Kassalong to Burkhal falls; *east*, the Burkul and Sirthay Tlang Ranges; *west*, the Myunee and Kassalong Rivers.

"No. II.—*The Soobalong Reserve* (area 91 square miles).—*North*, the Burkhal Tong; *south*, the head waters of the Soobalong River; *east*, the Sychul range; *west*, the Soobalong River."

The tracts proposed to be reserved have not been approved by Government pending an exploration of the forests by the Assistant Conservator and an acquisition of comparatively accurate and definite knowledge of the forests.

117. On the subject of reserves Mr. Davies writes in the following terms:—

"If it should be considered absolutely indispensable to have reserved forests, the tracts I would recommend as reserves are those drained by the Myanee, from where it joins the Kassalong to its source; the Renkheong above Phuroh; the Kurnafoolee above Ootrun Chutra; the Sungoo above the Thendoo Kheong; and the Matamoree above the Lagada Kheong.

118. "There are many reasons why reserves cannot be of any possible advantage in the hills, and I will proceed to show why they must be ineffective, and what I propose would answer quite as effectually without involving anything like the same expense as would be required for reserves.

"In the first place it is clear, judging from the data we possess of the last two years' consumption, that about 745 tons of timber in logs, 430 tons of beams, planks, and crooks, and 667 tons of timber for canoes, are required annually to meet the present requirements of Chittagong; and say we add only the same quantity of boats, leaving out the timber in logs and planks for the requirements of the hill tracts (we do not possess any statistics of their consumption), it becomes necessary for these forests to yield annually about 2,500 tons of timber of the better kinds, whilst of inferior wood, house-posts, and saplings, on an average 8,813 would be required, but for this there need be no provision made, for we have more useless wood than can be possibly required for ages, and it is this inferior fast-growing wood that springs up and shuts out the more valued kinds, which accordingly become rare.

119 "To me it appears very doubtful whether the forests bordering on rivers will continue their present rate of supply very much longer, and it has for some time been clear that each year the wood-cutter has further to go and more difficulty both in finding and bringing out large timber; and it is equally

certain that so long as there is a large consumption and good demand, and there is any timber left in the country, it will be brought out by the enterprizing wood-cutter, no matter where it grows, what the cost or difficulty, and therefore he may be safely left to secure his immediate wants as best he can. To put a limit to the quantity to be felled yearly would now be of little use; it should have been done years ago, and would simply give cause for complaint now without there being any possibility of the forests recovering themselves by natural reproduction. What then have we to gain by having reserves? If our forests were compact, of any value, and situated so that their timber could be easily taken to market, or in other words if we had any really good forests that might be improved by care and outlay, I should say by all means preserve them to the utmost; but such is not the case. Over vast wild and uninhabited country we have scattered tree forests, some parts of which are better stocked owing to their inaccessibility than others, but all presenting alike a scattered mixture of good and inferior wood. I presume the whole country could not be reserved, and therefore if a part of it was closed as reserves, all the unreserved portion would be open, and it would naturally be resorted to in preference to the reserved portion, where strict rules and regulations would have to be observed; all then that would be gained at the outside would be that the best places would be closed, which could be done just as effectively by administrative measures and orders from the civil officers.

120. "The whole of the timber country is uninhabited, and many miles away from villages of any kind, so that it would be difficult to get watchers or persons in charge of the reserves to live in them, except there were a number of them in each. Even if they were entertained in sufficiently large numbers to admit of their living in the forests, they would require at least one trustworthy officer in each reserve, otherwise they might dispose of any quantity of timber without detection; besides which I doubt whether any persons living in the forests all the year round would keep their health, and this would be really necessary, as men go up all the year round in the cold and hot weathers for beams and planks, and in the rains for canoes and logs.

121. "What I propose as far more effectual and feasible is to abolish the idea of 'reserves' in a country like this as perfectly impracticable, and to take advantage of the means nature has provided. We have large rivers down which all the timber must come, and any rules and laws can be quite as rigidly carried out by results being watched from the inhabited parts as by their actual observance in the forests. If sanction would be accorded to the employment of a small conservancy patrolling staff, it might be useful in helping to bring home to any person any breach of forest laws. I do not believe anything more is wanting, except it is effective rules to ensure our doing what we please with the forests. The present toll-collecting staff answers both as revenue collectors and a check on the size of timber brought out; in like manner it could be made the means of restricting the outturn of the forests, should it be considered necessary to limit such.

122. "The next question is, how are we to meet future requirements? To me it is quite evident that natural reproduction alone cannot be relied on, and that we must have recourse largely to planting, taking our present requirements as a guide to what we have to replace, and thus each year's outturn will show what we must plant to supply in course of years what we are now extracting from the forests. Each acre should have 100 mature trees standing on it after all thinnings are taken out; this would show that we must have 12 seedlings for every tree we intend to have, but to be safe I think at the least 25 seedlings should be planted for every log now brought down. This then will give us in lieu of a scattered, mixed, worthless forest, a valuable, compact, manageable, forest: instead of patching up a wreck we launch a new craft."

123. Regarding reserves the Deputy Commissioner of the Hill Tracts makes the following comments on the views expressed by the Assistant Conservator of Forests as cited in the preceding paragraphs. The Deputy Commissioner says:—

"The conclusion arrived at by the Assistant Conservator seems to be that there exist no particular parts of the district which are fit for reserve forests

save such portions as are extremely remote, and the inaccessibility of which has alone saved the timber from destruction by joom or felling. In this conclusion I concur, and I respectfully beg to support Mr. Davis's recommendation that we should abandon the idea of setting aside tracts of land as reserves until such time at least as we possess tracts upon which anything worth preserving is found.

124. "In speaking of reserves I limit myself entirely to the term in its most rigid acceptation, as prescribed in fact by the forest conservancy rules on the subject. I agree however with Mr. Davis that it is desirable to prevent any timber cutting in places where valuable timber still exists. A separate proposal on this head will hereafter be submitted.

125. "Having determined that in this district facilities for the introduction of the reserve system do not exist, it next remains to be considered what measures should be taken to regulate and perpetuate the supply of timber from the tracts. Mr. Davis estimates the present requirements of Chittagong in regard to timber to be 2,500 tons. It would have been instructive had a comparative return been submitted showing how this result was arrived at. I have requested Mr. Davis to remedy this omission.

126. "It is interesting to note, however, that a large increase has taken place this year, as compared with last, in the number of timber logs brought to market, while a corresponding decrease is shown in planks and beams sawn and cut in the jungles. The inference to be drawn from this is that the timber has been cut mostly in such remote and difficult places as to render the conveyance thereof by water safer and more convenient as logs rather than in the shape of planks, and that the supply of timber in places easy of access is therefore perceptibly diminishing.

127. "Supposing the estimate of consumption as above given to be correct, and granting that we prohibit all timber felling in the yet unexhausted forests of the district, there is every reason to suppose that the present rate of supply cannot be much longer continued; while, on the other hand, the measures taken to ensure a future and permanent supply of timber by planting is necessarily a remote and far distant panacea for an actual and fast approaching difficulty. Whether or not, under these circumstances, it would be wise to limit timber-cutting in the hills, that is, to prevent *all* felling of timber after such period annually, when a certain specified amount has been cut and brought out, and by such prohibition to cause a rise in the Chittagong market prices, and so stimulate the importation of wood from Arracan and elsewhere, seems to me to be a question which could most fitly be referred for an authoritative opinion to the head of the Forest Department—the professional adviser of Government in such matters. From the present state of affairs one conclusion at least seems to me absolutely and clearly deducible. It behoves us to expend a very much larger sum than we have hitherto done in planting seedlings and providing for future supply."

128. "I (the Commissioner of Chittagong) agree entirely with the views of both the Assistant Conservator and the Deputy Commissioner regarding the inadvisability of forming reserves. The forests of the district are too scattered in the first place to make it worth the heavy expense that would have to be incurred. From the nature of the country and the climate, the rules would be extremely difficult to work; and lastly, before coming to any final determination, I should deem it advisable to get more extensive and detailed local information. On this latter head much has been done during the year of report by Mr. Davis, but the stock of local knowledge is yet far from being exhausted, and therefore before making any substantive recommendation, I should prefer to increase it. Before action, knowledge. Meanwhile I am strongly opposed to the policy of forming any reserves at all."

129. It appears to the Conservator of Forests that the Commissioner has expressed the right thing by doubting the sufficiency of the knowledge of the forests which has been collected. To watch matters from a distance, as the Assistant Conservator seems to advocate, would be detrimental. On the contrary, he should try and draw up sketch maps showing the distribution of

the forests, ascertain their approximate areas, contents of timber, and rate of growth. If this had been done, it would be possible to determine by calculation whether the stock of growing material is sufficient to guarantee the required material for any length of time, or how far it falls short of it—questions which have a heavy bearing on the decision whether reserves should be formed or not. At any rate the question of reserves should be left open for the present.

Palamow.

130. In this district 178·12 square miles of forest land have been marked off for forest purposes. The question whether they should be declared "reserves" is now under discussion.

SECTION III.

Protection and Improvement of Forests.

131. *Establishments.*—A number of additions to the subordinate establishment has been made during the year. The new reserves in Assam have received an establishment consisting of one forester and five watchers for the Kamroop sal reserves, and one forest ranger and five watchers for the Nowgong reserves. For the unreserved forests of Assam an establishment of one daroga and four watchers has been provided for each of the Kamroop, Durrung, Nowgong, Seebsaugor, Luckimpore, and Khasi and Jynteah Hill districts. These are posted under the Deputy Commissioners, who are in charge of the unreserved forests.

132. In Chittagong the following additional establishment has been sanctioned:—

1 Inspector of tolls, per month	...	...	Rs.	120	0	0
1 Forester „	...	...	„	25	0	0
3 Watchers, at Rs. 7 „	...	...	„	21	0	0
4 Ditto, at „ 6 „	...	...	„	24	0	0
		Total	Rs.	190	0	0

133. A reorganization of the superior and subordinate establishments is urgently necessary and now under consideration. At present we have one Conservator of Forests and 11 executive officers, partly supernumeraries. For Cooch Behar we require three officers, Assam four, Dacca one, Chittagong one, Office of Forest Account one,—total 10. One officer may always be considered on leave, or junior, so that the present staff is just sufficient for four divisions. During the next season one officer will be required for the Garo Hills, where valuable sal forests are still existing; two officers are likely to be required for the Sunderbuns; and in the whole of western districts, Patna, Bhaugulpore, Chota Nagpore, and Cuttack, forest matters have still to be taken up. To provide English officers for all these purposes will be difficult and very expensive, and the Conservator believes it to be preferable to introduce into the administration a superior class of native officers—rangers.

134. In order to do so, certain changes in the organization of the department will be necessary; the controlling work will have to be entirely separated from the executive work, and a forest class should be established in connection with one of the engineering colleges. The views of the Conservator on the subject have been laid before Government in a special report.

135. The present subordinate establishment is altogether insufficient, and an increase has been applied for

136. *Breach of Forest Rules.*—During the year under review only eight cases, in which ten persons were concerned, have been brought before Magistrates, out of which only two convictions were obtained, and two cases are pending.

137. *Fire suppression and cutting of creepers.*—Endeavours were made to protect the Sivoke and Dulka Jhar forests against fire; but before the measures could be brought to a close, the fires began to run into the forests, causing

the labor spent to be wasted. In the Mooraghat a beginning was made by protecting effectively 420 acres of sal forests by means of cleared pathways and burning the jungle outside. A beginning has also been made to cut the creepers in Mooraghat and Sivoke. During the coming season it is proposed to take this class of work vigorously in hand. The sal forests in the Mahanuddy terai range, in Mooraghat, and on the Kulsi in Assam, are the areas selected for a beginning.

SECTION IV.

PLANTATIONS.

138. The area planted on the 1st April 1872 amounted to 504 acres, and during the year 89 acres have been added. According to species of trees we have—

	Acres.
Plantations of temperate trees	450
„ teak and toon	68
„ conifers	42
„ caoutchouc	28
„ fruit trees	5
Total ..	593

The Conservator has examined all the plantations in Cooch Behar and Assam, and the following descriptions have been compiled from his own notes.

Cooch Behar Division.

139. *The Rungbool plantation* is situated on the western and south-western slope of the ridge running from Jore bungalow to Senchal. The road from Jore bungalow to the old barracks forms the upper, and the old road from Jore bungalow to Kurseong, the lower boundary. The plantation begins a short distance south of Jore bungalow, and its elevation is about 7,500 feet above the sea. The substratum of the locality is gneiss, the soil clay mixed with sand of a reddish color in the lower, and of a dark color in the upper part. On the whole the soil is good for the growth of timber trees; but the slope is steep in most parts, hence little surface soil.

140. The forest surrounding the plantation consists of a variety of trees, the most important of which are the following :—

Champ	White magnolia	*Michelia excelsa.*
Lal champ ..	Red magnolia	*Magnolia Campbellii.*
Katoos	Chestnut	*Castanopsis tribuloides.*
Book	Oak	*Quercus lamellosa.*
Phalat	Oak	*Quercus annulata.*
Lali	....	*Phœbe sp.*
Kabashi ..	Maple .. .	*Acer sp*

These forests are rich chiefly in old timber. The trees, densely covered with creepers, attain a very good height. Book, katoos, lali, and kabashi appear to be more numerous than the others ; lal champ is rather scarce.

141. Preparatory to planting the whole area was cleared of timber, of which a great portion is now lying on the old road from Jore bungalow to Kurseong. It is difficult to ascertain now the exact areas planted in different years ; but it appears that the bulk of the plantation was made in 1868 and 1869, and that about 70 acres were added in 1871 in the upper part of the plantation. The original planting in 1868 seems to have been done with seedlings collected in the surrounding forests, which may have been of stunted growth and older than they appeared to be; they had not suffered from jungle fires, however, as the latter are extremely rare in the upper hill forests. The seedlings are said to have been put into nursery beds for one year before they were planted out, but that is doubtful. After having been planted the greater part of the young trees, instead of growing on, seems to have died down to the stock, and the latter then sent out fresh shoots. In 1869 additional plantings were made with seedlings raised in nursery beds, especially *acrote* (walnut). In 1871 the

addition of 70 acres was made and failures replaced, both with seedlings raised in nurseries.

142. The younger and older plants are now mixed with each other nearly over the whole area, and the plantation should be taken as "one" raised between the years 1868 and 1871. The plants along the lines of march in all parts of the plantation were measured on the 9th January 1873, and the following table shows the result of these measurements :—

Name of tree.	Total number of plants counted and measured.	Average height per tree in feet and inches.	Largest plant measured.	Smallest plant measured.	Proportion of each kind in per cent.
Champ	139	1′ 9″	6′ 3″	3″	34 per cent.
Acrote	111	2′ 10″	7′ 6″	10″	27 „
Book	79	2′ 10″	5′ 0″	9″	19 „
Phalat	45	3′ 3″	6′ 6″	9″	11 „
Katoos	36	2′ 8″	5′ 10″	8″	9 „
Total ...	410	...	...	...	100

It was found impossible to ascertain the area actually stocked without a good deal of labor, but it is estimated that about two-thirds of it is fairly covered with seedlings. Herbaceous plants and shoots from old stumps form a thick cover, which has smothered many plants.

143. The growth of *acrote* (walnut) is very good, the plants being strong and healthy. Of the others, some plants are now very vigorous, but their growth on the whole is not good. *Acrote* thrives well from early youth when exposed to the full light of the sun, but *champ*, oaks, and katoos seem to prefer some protection during the first years of their existence, and they should be reared in half shade. Of *lal champ* a few natural seedlings were found in the plantation, which show habits similar to those of *acrote*.

144. Entire clearings in the upper hill forests are mistakes. Moreover, it is a very difficult task to reclaim a plantation which has turned out entirely or partly a failure in the first year. Under these circumstances no further attempts to fill up the vacancies by artificial means should be made. If all shoots and seedlings, irrespective of species, are allowed to grow, the area will be fairly stocked with young forest in a few years. Afterwards the useless trees might be removed to make room for the more valuable species.

145. The expenditure incurred during the year amounts to Rs. 75-6, and the total expenditure up to the 31st March 1873 to Rs. 9,195-0-6, which is at the rate of Rs. 27-7 per acre.

146. *The Dhobee Jhora plantation* near Kurseong is situated on the upper part of the western slope of Mahaldiram, at an elevation of about 5,600 feet. It is believed to have been established in 1866; its extent is given as 42 acres, and the number of plants now alive as amounting to 3,584. The conifers planted are *Cryptomeria Japonica*, *Thuya orientalis*, and *Curpressus funebris*. The trees thrive fairly well, some of them having attained a height up to 18 feet. The ground is covered with brambles, weeds, grass, &c., but no clearing is necessary as the young trees are above the jungle, and will be able to contend successfully against it. The expenditure during the year was 8 annas, and the total expenditure Rs. 32, or at the rate of 12 annas per acre; but there is no doubt that this is only a portion of the actual expenditure, the rest having been charged off under some other heading.

147. *Bamunpokree teak plantation.*—By far the most important experiment is the introduction of teak into Sikkim. A plantation of this most valuable tree has been established in the Bamunpokree reserve, situated on the southern slope of the Bamunpokree spur. The area of the reserve is 1,372 acres. It is bordered on the east by the Ruktee River, and on the south and west by the road from Silligoree to Punkabaree. On the south side, however, there is a small strip of land between the Government reserve and the road, which belongs to the late Mr. Barnes' estate. The upper part of the reserve consists of a plateau; and on the sides the gradient is steep, but towards the southern part it runs out into a gentle slope. The drainage of the spur runs into the Ruktee, which follows a south-easterly direction, and joins the new Balasan River about five miles above Silligoree. The Balasan runs to the south-east, and joins the Mahanuddy about a mile below Silligoree. The Mahanuddy in its turn follows on the whole a southerly direction, and falls into the Ganges about 80 miles above Kooshtea, where the Eastern Bengal Railway touches that river.

148. The timber produced on the south side of Bamunpokree spur would have to be transported the following distances:—

Dragging to the Ruktee on an average	½	mile.
Floating in single logs to the Mahanuddy ...	14	miles.
Ditto small rafts to the Ganges	180	,,
Ditto large rafts to Kooshtea	80	,,
Total land carriage ...	½	mile.
Total water carriage ...	274	miles.
Grand Total ...	274½	miles.

The floating over the first 14 miles to the Mahanuddy presents some difficulties, as the water in the Ruktee and Balasan rises and falls very suddenly, but hardly more so than the floating in most creeks in the Burmah teak forests. On the other hand, labor is at present cheaper than in Burmah, and teak timber from the Bamunpokree spur could therefore be delivered at Kooshtea at the same or at a lower rate than teak timber from the plantations in the Tharawaddy division in Burmah at Rangoon.

149. The rainfall on the Bamunpokree spur is believed to be just above 75 inches, which is more than necessary for teak, but not too much. The soil on the southern extremity, where the present teak plantation has been established on a gentle slope, is two feet deep, consisting of decayed gneiss extensively intermixed with vegetable mould, which mixture forms a very rich, fine-grained, light, and black soil. At a depth of two feet gravel of gneiss appears, which, it is assumed, changes gradually into gneiss rock, the latter forming the underlying stratum of the whole spur. These conditions must be considered as very favorable for the growth of teak. The area fit for teak is estimated to amount to about 700 acres.

150. The natural forest on the Bamunpokree spur is valuable, and especially rich in trees in the upper portion. The more important kinds growing on it are the following:—

Sal (*Shorea robusta*), especially on the slopes and lower portions.
Chalownee (*Gordonia sp.*), chiefly in the upper part.
Toon (*Cedrela toona*), in few specimens near water-courses.
Seet sal (*Dalbergia latifolia*) in few specimens, all small.
Seeda (*Lagerstræmia parviflora*).
Several species of *dillenia*, *terminalia*, *ficus*, and *oodala Sterculio villosa*. The bark of the latter is a very good material for ropes.

151. The teak plantation consists of three blocks, namely:—

	Acres.
One made in 1868 extending over ...	7
Ditto 1871 ,, ...	3
Ditto 1872 ,, ...	30
Total ...	40

The plantation of 1868 was prior to planting cleared of trees, in some parts entirely, and in others some sal and seet sal was left standing. It was laid out 6 feet by 6 feet. Whether the seeds were sown directly on the area, or whether it was stocked with seedlings raised in nurseries, is doubtful. In spring 1869 about 800 plants only appear to have been alive, and all vacancies were replanted in that year. Where no old trees have been left standing, the young teak trees cover the ground now completely, and they look very vigorous. Under and between the old trees teak is of less good growth, but it is possible that in these parts the soil is somewhat inferior. Where the teak has closed up overhead no tall grass has sprung up; in the rest of the plantation a good deal of it has established itself. In an average line all trees were measured four feet above the ground, and the following results obtained:—

Total number of trees measured	.. ..	80
Average girth per tree	.. ..	5·51 inches.
Average height from	.. ..	12-15 feet.
Trees now alive in per cent of those originally planted	.. .. 67 per cent.	100
Failures	.. .. 33 „	

An insect was found which sucks the *parenchyma* out of the leaves. The specimens obtained were old and defective, and Dr. Stoliczka of the Geological Survey, to whom they were sent, was unable to recognize the exact species. The insect will be watched so as to obtain good specimens for determination. It may be remarked here that the same or a similar insect attacks young teak in Burmah, where good life specimens have not been caught up to the present time. Some attempts towards pruning have been made by cutting off the ends of the lower branches. Most of the branches thus treated are now dead; some are still alive and have sent out fresh leaves. This method of pruning is objectionable; and if pruning of side branches is done at all it should consist of cutting them off close to the stem with a hand saw, so that the wound may grow over. Thinning will not be necessary for at least one year more in the best part, and for at least two years in the inferior part of the plantation.

152. The plantation of 1871 was made with transplants. The seed was sown in a nursery in June 1870, but it did not germinate until the beginning of the rains of 1871, probably owing to its having been covered one and a half inches to two inches deep with soil. The *cotyledones* of teak are large, and they have to be brought above the ground, consequently the covering of the seed should be very thin, not more than one-eighth of an inch. The seedlings were transplanted into the present plantation in July 1871, ten feet apart. Measurements were taken in one line on the 5th January 1873 with the following results:—

Number of plants measured	... ...	...	19
„ „ failures	... ...	...	4
Average height per plant		...	7 feet.
Percentage of original plants alive, 83 per cent		... ..	100
„ „ „ failures 17 „		... ..	

The plants look vigorous, but they have been planted too far apart, and the ground will not be covered for at least two years more. This will not only affect the growth of the trees, but it will also necessitate an additional heavy expenditure on account of keeping the grass and other vegetation down.

153. The plantation of 1872 was made with transplants. The seed, it is believed, was sown in nurseries in April and May 1872, and the seedlings were transplanted in June, July, August, and September 1872, at distances 6 feet by 6 feet. Numerous countings were made on the 5th January 1873, with the following results:—

Total number of planting spots examined		.. ..	1,459
Number of plants alive	.. ..	..	1,072
„ failures	.. ..	..	387
Percentage of plants alive 73 per cent.		.. ..	100
„ failures 27 „		.. ..	

Of the remaining 73 per cent. a good portion looks sickly. The plants are almost all under 6 inches high, and most of them very small. In many cases the upper lateral roots are exposed to the sun, owing to the careless way in which the laborers have worked the soil around the plants. The northernmost part of the plantation is almost entirely a failure. Here the planting spots in two lines were examined with the following results:—

Plants alive	...	...	...	...	21
Failures	...	...	...	...	95
			Total	...	116
Percentage—Alive, 18 per cent.		...	...	...	100
Failures, 82 „		...	...	...	

This portion as well as several others of smaller extent will have to be replanted this year.

154. One of the reasons why the plantation is in such an unsatisfactory condition may be found in the fact that the nurseries are situated about one-fourth of a mile distant from the north-west corner of the area planted. Thus the plants had to be carried on an average about two-fifths of a mile. This is very objectionable, considering how difficult it is to obtain laborers, who will bestow the proper care upon the seedlings while in transit. The same mistake, it should be remarked, has been made in forming the plantations of 1868 and 1871, but the disadvantage was then easier to overcome, because operations were carried on on such a small scale. The nurseries of teak should, whenever possible, be situated in the centre, or at least on the border of the piece of land to be planted. When planting is going on the work should be so arranged, that the plants taken out of the nursery beds are at once transported to the place where they are to be planted, and they should be put into the ground without delay.

155. A number of sisu and toon seedlings collected in the natural forests have been planted, partly in a place between the teak plantation and the old nursery, and partly in a place of ·31 acres extent adjoining the teak plantation of 1871. The sisu seedlings are out of their proper element, and they show indifferent growth. The toon thrives better, and if reared from seed, the plants will do well in situations like that of the present plantation.

The expenditure during the year amounted to Rs. 2,002-3-9, of which sum Rs. 785-13-9 are not shown in the year's account owing to the cinchona department having presented the bills after the close of the year. The total expenditure amounts now to Rs. 4,375-13-7, or Rs. 109-6-4 per acre. The plantation has been under the charge of the cinchona department during the year, but it has now been made over again to the Forest Department.

156. During the present year the vacancies have all been filled up, and an extension is being made of teak, sal, and toon mixed. In addition 20 acres of caoutchouc plantation are under preparation on the Bamunpokree spur. These will be reported on next year.

157. *Ramshai Hat and Fallacotta.*—Two small experimental plantations of teak have been made, one in the lower Toondoo forest near Ramshai Hat, and another near Fallacotta. The situation of the former is on a plateau about 40 feet above the general level of the plains. The soil appears to be fairly good, and the subsoil (gneiss) favorable; but the trees in the vicinity, especially sal, are not of good growth, and it is doubtful whether teak will grow into large and well-shaped trees on the locality chosen. The plantation itself was laid out in 1869, extending over a few acres. Subsequently it appears to have been neglected; at all events it has been burnt down repeatedly by jungle fires. At present there are only a few shoots from burnt-down trees to be found. Some of these look vigorous, but no decisive opinion can be formed regarding the growth of teak in the locality. The small teak plantation near Fallacotta was laid out in 1872. The locality chosen is situated near the bank of the old Toorsa in the middle of a grassy plain without trees,

and at an elevation just above the flood level during the rainy season. A number of plants are growing, but their prospect of becoming large and well-shaped trees appears to be very small indeed. The Conservator of Forests is of opinion that localities like the one chosen are utterly unsuited for teak, and just as much or as little likely to produce good teak timber as the country around Calcutta.

158. *Mahanuddy and Gulma plantations.*—These are two experimental caoutchouc plantation in the Sikkim terai on low-lying savannah tracts. In the Mahanuddy block *Ficus laccifera* and in the Gulma block *Ficus elastica* has been planted. In each 1,500 cuttings three feet long were stuck in the ground. Of the *Ficus laccifera* 80 per cent. were found dead, and the remaining 20 per cent. unhealthy looking. Of *Ficus elastica* only one plant has been found alive. On the whole these two experiments are failures, the result of want of care.

Assam.

159. In this division plantations have been only experimental up to the present, with the view of ascertaining whether teak will thrive in the province. Plantations have been established on the Kulsi River, about 30 miles west of Gowhatty, and at Makoon on the Dehing River, 60 miles east by south-east from Debrooghur.

160. *The Kulsi teak plantation* is situated on the right bank of the Kulsi, about seven miles below the point where it emerges from the Khasi Hill. The Kulsi is an excellent river for floating, it having a current of water all the year round, and no obstruction below the plantation. The distance of the latter from the Brahmaputra is about 15 miles. The tract selected as plantation reserve comprises an area of 5½ square miles, consisting of a number of low hills with low lands between. The latter contain a number of *jheels* or pools of standing water. The slope of the hills is steep in the upper portion, but gentle near the foot. The rock is gneiss with a good deal of quartz. The soil is a mixture of loam, clay, and sand, the latter being greater in proportion round the foot of the hills than on the upper slopes. The soil in the former localities is intermixed with a good deal of vegetable mould, and of good quality to a depth of several feet. The forest on the hills is of the class designated as lower hill forest, containing a large variety of trees including sal and a good proportion of bamboos. The growth of the trees is very fair, and that of sal is good.

161. The plantation was commenced in the beginning of July 1872 on a gentle slope immediately adjoining the Kulsi. The clearing of jungle lasted from that time until the middle of September. The seed was sown chiefly in nurseries on the 7th July, namely, Burmah seed of 1872 and 1870, and Assam seed of 1872. One half of an acre was sown direct 6 feet by 3 feet on the same date. The Burmah seed of 1872 germinated best, then that of 1870, and then the Assam seed. By the end of July all the seed had germinated. Transplanting commenced on the 1st September, 6 feet by 6 feet with plants about 3 inches high, first those raised of Burmah seed of 1872, then of Burmah seed of 1870, and last those of Assam seed. The transplanting was completed on the 14th September—

Area transplanted	...	...	...	7¾ acres.
Area sown direct	...	...	...	0½ „
		Total	...	8¼ acres.

162. The plantation when examined on the 18th and 20th May 1873 presented the following condition: The portion of the area sown direct is better than the rest. All plants in the former look vigorous. The portion transplanted first (Burmah seed of 1872) looks almost as well as the part sown direct; rain fell after the transplanting had been done. The transplants done last are much inferior, very little or no rain having fallen after the transplanting. It should be noted that the latter was done too late in the season, and that

different results might have been obtained if it could have been done earlier. 1,547 planting spots were examined, which gave the following results :—

Area on which the seed was sown, direct failures	...	4 per cent.
First transplants (chiefly Burmah seed) ...	...	12 „
Last transplants (chiefly Assam seed) ...	...	8 „
Average failures	...	8 „

The height of the plants ranged from a few inches up to two feet. The earth on the planting spots generally was loosened one foot square and one foot deep. No jungle clearing was necessary after the planting until April 1873. Regarding the appearance of the plants, as compared with those in Burmah, it is observed that their stems, instead of being square, are in most instances bottle-shaped, which circumstance is unfavorable and requires special attention.

163. The expenditure on this plantation amounts to Rs. 411-13-6, or at the rate of Rs. 51-8 per acre. During the present year an extension of about 30 acres of teak and toon mixed has been made, also a small plantation of sisu and 20 acres of caoutchouc.

164. *Makoom plantation.*—The Conservator visited and examined this plantation on the 5th July 1873. The site chosen is on the right bank of the Dehing River, 21 miles above Jaipore. The Dehing is fit for floating at all seasons of the year, and it contains no obstructions below Makoom. The distance to the junction of the Dehing with the Brahmaputra is about 100 miles. The plantation is situated on level ground, about 15 feet above high water level. The drainage is defective, but owing to the soil being a loose yellowish loam, and deep, the water sinks comparatively fast into the ground. The forest is dense evergreen mixed plain forest, with a great deal of rank vegetation and some bamboos. The land appears to have been joomed formerly.

165. The plantation was commenced in July 1869, when one acre of ground was sown direct 6 feet by 6 feet, the vacancies being filled up from a small nursery. The seed germinated well, and the area is now fully stocked. In July 1871 a little less than one acre was added, the seed being sown in a nursery, and the seedlings afterwards transplanted 6 feet by 6 feet. This area also is well stocked now. In July 1872 two and a quarter acres were added, namely, two acres by transplants, and a quarter of an acre sown direct, all 6 feet by 6 feet. The seed in the latter portion did not germinate, from what reason is unexplained; but doubts seem to be entertained as to whether the seed has been put down at all. The two acres transplanted are now half-stocked, the remaining 50 per cent. being failures.

166. The plants and young trees in the whole of the four acres are evidently growing very fast, those in the four years' old plantation being up to thirty-three feet high, and in the two years' old block up to sixteen feet; but there are evident signs of unhealthiness. Numerous trees are dying off by decaying just where they leave the ground. A four years' old tree found lying on the ground had decayed right through. The wood from one foot above the ground upwards was perfectly sound and healthy, without any trace of insects having attacked it, whereas it had rotted away a few inches above and below the surface. The roots of the plants dead or dying are diseased, and partly rotten. Many of these trees, *not all of them*, have been attacked by an insect, the grub of a beetle, which enters the younger plants just above the ground and eats its way up in the centre of the stem. There is no doubt, however, that this insect is not the cause of death or disease, but the consequence, as several dying plants and trees showed no signs whatever of having been attacked by it. In the oldest plantation the bark and sap-wood of the trees up to a height of four feet from the ground were found so soft that they could be scraped off with a stick. They are extensively eaten up by ants. Most of the larger trees in the plantation of 1869 have no leaves on their upper branches, or they were just appearing (5th July); whereas the lower branches had a dense foliage. The shape of the trees is not good, they having a tendency of sending out strong side branches below, although they are sufficiently close together and cover the ground perfectly. Moreover,

by far the greater number have sent up two and three leading shoots, and even those which have only one stem below are divided into several branches at about 25 feet from the ground. These peculiarities in a well-closed plantation are unmistakeable signs that the locality is not adapted for teak, and it appears very doubtful whether the cold dampness of Upper Assam will allow teak to thrive. This view is corroborated by the appearance of a number of *teak trees at Jaipore* said to be now 20 years old. The number of trees originally planted is said to have been much larger than those now alive. Whether the trees have been removed while alive, or after they had died, could not be ascertained; but the remaining trees are very instructive. Jaipore is situated on the bank of the Dehing above high-water level, but a portion of the teak trees in question are said to be on ground sometimes inundated for a short time when the water rises to an exceptional height. On this point, however, I am not quite satisfied. The trees now found are 3 to 5 feet in girth and up to 45 feet high. They look very miserable, some have died, or are now dying; and of those still alive one has been attacked by white and other ants, which have eaten up bark and sap-wood on the lower part of the stem. Their shape is very inferior and much fluted. The trees have received casual injuries, but not by any means to such an extent as to explain their present appearance.

167. There is one point to be considered, however, namely, that the trees at Jaipore as well as those at Makoom are standing on level ground, and it may be that trees growing on thoroughly drained slopes will do better. With the view of ascertaining this, arrangements have been made to plant half an acre on undulating ground between Jaipore and Makoom. The ground in question bears very fine lower hill forest with a very large proportion of bamboos, and it is a great pity that the experimental plantation has not been established on it four years ago.

168. The expenditure during the year amounted to Rs. 183-12-6, and the total to Rs. 536-12-6, or at the rate of Rs. 134-3 per acre.

169. *Shillong tree nursery.*—An attempt has been made to raise European genera of timber trees in the Khasi Hills. Seed beds were carefully prepared and a quantity of seed sown, but none has germinated. Of Australian seed some acacias have come up. A garden of five acres in area and stocked with European fruit trees was bought at the recommendation of the Commissioner for Rs. 950. There is a large variety of trees, as apples, pears, peaches, apricots, cherries, gooseberries, plums, raspberries, currants, olives, figs, and others, which are mostly doing well.

Chittagong.

170. The Commissioner gives the following account of plantation operations in the division: "During the first year of plantations, two plans were tried. One plan was to give seeds to joomeahs in the hill tracts. This was done by the Assistant Conservator in concert with the Deputy Commissioner; and at the time the seed was distributed; a bonus of Rs. 5 per seer was given with the seed, and joomeahs were further given to understand that when the seed came up, they would be paid a fair rate per hundred for all the plants they could raise; and if the seed did not come up, they would not be called upon to refund the money they had received, nor would they be held in any way responsible for the future. Thus encouraged they readily took the seeds and money, and it was only reasonable to expect some return; but out of 25 seers comprising about 38,000 seeds only 37 plants came up, showing beyond a doubt that this method was at fault. The other plan was to open a small nursery by Bengali daily laborers, and as soon as the seedlings came up to transplant them. The small nursery that was formed measured about 30 square feet, and in it the seeds came up profusely, and were transplanted as soon as high enough. Of these 240 are living."

171. The operations of the last year have been thus described by the Assistant Conservator: "During the past year eight acres were planted at Sitapahar, and five acres at Pahartallee, near the station of Chittagong. A few seeds were likewise sown near Kassalong.

"The plan of sowing five seeds at each stake was tried, and in addition small nurseries were opened; but, strange to say, very few of the seeds at the stake came up compared with those put into the nurseries.

"The result of the last counting shows 2,130 seedlings to be standing on the Sitapahar site and 1,129 at Pahartallee, whilst out of 200 seeds not one has come up at Kassalong; but this I am not surprised at, as they were put in at stake, and for some reason the seed will not germinate when so sown. Most probably the soft earth in the *thullees* retains the water which cannot escape through the hard sides of the holes, and thus rots the seed. The seedlings average one foot in height, and are at present going through the most trying weather; a little rain would do them a deal of good.

172. "The great and I may say the only drawback to extensive plantations is that we cannot rely on getting seed from Burmah delivered in time. Last year the seed arrived in the middle of May; and as it takes fully one month for it to germinate and another month before it is fit to transplant, it is the middle or end of July before the transplants are fairly in the ground, and then they have hardly time to settle and throw out new leaves before the rains cease, and they have to struggle through the ensuing draught, which in many cases cripples or kills them."

173. The Assistant Conservator describes the operations of the current years as follows: "This year the land between the Holingamara Hill and the Kaptie has been selected, and about 100 acres prepared. Nurseries for about 10 maunds of seeds are being dug, and are nearly ready. I may say they would have been ready long ago, but the delay caused by the seed not having arrived from Burmah, which, though written for and remitted against in December and promised in February, has not yet arrived; and I have had purposely to delay the nurseries in order to avoid having to dig them again.

174. "It is proposed this year to put in a small crop of cotton with the teak as a means of reducing the cost of planting. The measure has to be done on a limited scale to guard against the possibility of not getting sufficient labor, and if found to answer this year, it may be the means of our eventually getting the hill-men to plant regularly with their jooms. It is likewise intended to fill up all vacancies in last year's plantation, and for this purpose suitable nurseries have been prepared in both localities."

175. The cost of the operations amounts to Rs. 410-13-9 at Sitapahar, or Rs. 51-6 per acre, and to Rs. 324-14-6 at Pahartallee, or Rs. 65 per acre. It should be noted that the plantations are only very thinly stocked. Mr. Davis gives the number of plants alive at Sitapahar at 2,130, and those at Pahartallee at 1,129. The areas are eight and five acres respectively; the planting, it is believed, 6 feet by 6 feet, and consequently the failures amount to 78 per cent. at Sitapahar and to 81 per cent. at Pahartallee. These results, especially when coupled with the expenditure, are unsatisfactory. The Conservator considers it necessary to state here that he does not approve of the views expressed by the Assistant Conservator regarding the failure of the germinating of teak seed sown at stakes.

Plantation Records.

176. Records of the plantation operations have not been kept regularly; and with a view to regulating the subject, the Conservator of Forests has drawn up a set of rules, copy of which will be found in Appendix E. If these rules are strictly adhered to, we shall obtain a complete history of the artificial forests.

Teak in Bengal generally.

177. The question whether teak should be largely introduced into Bengal, has been extensively discussed during the last few years, and the Conservator has bestowed special attention upon the subject. In the Bengal plains teak will doubtlessly grow into large trees, but it is just as certain that it will not form fine stems. Any one who looks closely at the trees growing at Calcutta will at once discover that the stems, boles, are not only short for timber

trees, but usually badly shaped, fluted, so that the generality of trees will not yield fine beams. In the plains of Behar similar observations can be made. The Conservator has measured and examined the larger trees at Bankipore, Arrah, and Sherghotty, and obtained the following results :—

Number.	Girth at 4 feet above the ground.	Length of bole.	Estimated cubical contents of bole.	Height of trees.	Remarks.
		At Bankipore.			
1	5′ 6″	15′	25		Stem irregular.
2	7′ 9″	8′	26		Horizontal section of stem star-shaped or fluted. At eight feet divided into two branches.
3	5′ 8″	10′	19		Above ten feet all branches.
		At Arrah.			
4	7′ 10″	16′	48	From 40 to 70′	Very bad shape; fluted.
5	5′ 8″	20′	25		Less fluted than former, but crooked.
6	5′ 6″	12′	12		Shape tolerably good, but falling off in girth from eight feet upwards.
7	4′ 9″	24′	20		Little fluted; fairly shaped, not quite straight. This is the best tree at Arrah.
8	3′ 7″	10′	6		Badly shaped.
		At Sherghotty.			
9	9′ 11″	15′	60		Much fluted, and badly shaped altogether.
10	8′ 6″	10′	30		Badly shaped, fluted, and falling off in girth towards the upper part.
11	7′ 6″	24′	24		Badly shaped, fluted.
12	7′ 5″	15′	34		Ditto.
13	7′ 4″	16′	28		Shape tolerably good, but falling off in the upper part on account of large branches.
14	7′ 0″	7′	20		Fluted, above seven feet all branches.
15	7′ 0″	20′	30		Fairly shaped, but from ten feet upwards only half the girth on account of side branches.
16	6′ 11″	12′	25		Fluted, but stem not very bad.
17	6′ 7″	4′	11		Above four feet divided into three branches.
18	6′ 3″	15′	20	From 40 to 60′	Badly shaped. At ten feet two large side branches.
19	6′ 3″	15′	18		Badly shaped, falling off from ten feet upwards on account of side branches.
20	6′ 1″	7′	15		Fluted, above seven feet divided into branches.
21	6′ 1″	14′	22		Up to eight feet well shaped, above that badly on account of large branches.
22	6′ 0″	16′	20		At eight feet divided into four branches, one being a straight continuation of the lower stem; upper eight feet of bole only four feet girth.
23	6′ 0″	12′	20		Badly shaped.
24	6′ 0″	16′	20		Upper part falling off considerably on account of large branches. Shape otherwise fair.
25	5′ 8″	10′	18		Bad in every way.
26	5′ 5″	12′	20		Lower part fairly shaped; from eight feet upwards only half girth.
27	5′ 5″	10′	18		Fairly shaped, but lower part fluted.
27	.....	.....	664	.....	
Average per tree ...		...	24·6	.....	

The above data prove that teak will grow into large trees in the Behar plains as far as girth is concerned. What time was necessary to produce the trees cannot be stated with certainty, as no reliable data regarding the age are obtainable; but it is believed that the oldest trees have been planted about 75 years ago.

178. Regarding the quality of the timber no doubts need be entertained. Experiments made by the Executive Engineer, Dehree Workshop Division, with teak grown at Arrah, show that its breaking strength is 16⅔ per cent. greater than that of Moulmein teak. It is described as close-grained and sound. None of the trees contained in the preceding list show signs of unsoundness.

179. In one very important point, however, teak grown in the Behar plain fails, and that is in the shape of the stems. In Burmah the teak localities are classified according to the higher or lesser regularity of the stems produced in them. The slopes of the Pegu Jomah produce generally regularly shaped and tall stems yielding good logs up to 70 feet in length, and that is the class of timber which is exported. On alluvial soil or in unfavorable localities generally, on the other hand, teak is liable to produce stems which are not only short, all the rest being branches, but they are, moreover, irregularly shaped. Of such trees a horizontal section shows usually the shape of a star, and it is this class of timber which is now produced in Behar. To grow in these localities teak which can compete with that imported from Burmah, and for all purposes where long beams are required, is out of the question; but, on the other hand, timber fit for most local purposes can be produced. The trees enumerated in the preceding list will yield logs from 4 feet to 24 feet in length. They have grown up single, and consequently the formation of large side branches has been favored. If teak is, on the other hand, raised in closed plantations and properly attended to, clear stems of 20 feet and upwards will be produced.

180. It appears to the Conservator that in the late controversy regarding the rearing of teak near or beyond its northern limit, the standard of trees to be produced has been put too high. What is meant is, that from several sides it has been made a condition to produce teak similar to that imported from Burmah, or none at all. Now, in the Behar plains, except where sal grows, there is hardly any species amongst the indigenous timber trees which will produce a larger piece of timber than teak; and as the latter is infinitely superior in quality, it is quite evident that, if any trees at all are to be raised, teak should be one of them. On the other hand, the establishment of mixed plantations is strongly advocated.

181. The reproduction of teak will not be found very difficult, judging from what may be seen at Sherghotty. In the old cutcherry compound at that station a number of old teak trees are growing, the seed of which has, since the abandonment of the cutcherry, produced quite a little forest of teak seedlings and saplings around the old trees. And again, seed fallen from trees growing on the Grand Trunk Road near Sherghotty has germinated, and a number of saplings have thus been produced without any artificial interference.

182. The above data are sufficient to prove that the climate of the Behar plains does not seriously interfere with the vitality of teak, although it differs considerably from that in localities where teak is known to thrive.

183. At the station of Hazarcebaugh teak has been successfully introduced. The measurements of the larger trees are subjoined:—

Number.	Girth at 4' above the ground.	Length of bole.	Estimated cubical contents of bole.	Remarks.
1	8' 0"	10'	36	Star shaped; fluted.
2	10' 2"	7'	42	At seven feet divided into four branches; fluted, badly shaped.
3	5' 10'	12'	18	Fairly shaped, little fluted.
4	7' 6"	11'	25	Above eleven feet divided into three branches; much fluted.
5	6' 5"	12'	20	Shape tolerably good, little fluted; above twelve feet divided into four branches.
6	9' 1"	10'	40	Tolerable shape; above ten feet divided into three branches.
6	.....	.....	181	
	Average per tree ...		c. feet 30	

On the whole there is little difference between the teak at Hazarecbaugh and that at Arrah, Bankipore, and Sherghotty.

184. In the Sikkim terai no old trees are available which could assist us in coming to a conclusion, but the young trees in the Bamunpokree plantation have grown well so far. Since the present rains have set in, however, it has been reported that a good many of the five years old trees as well as of those two years old have lost their leading shoots. This may be due to want of vigour in the upper part of the stem, but it may also be due to the effect of a jungle fire, which passed over the plantation just before it was made over by the Cinchona Department to the Forest Department. One fact is not favorable, however, and that is the tendency which the trees have of throwing out strong side branches low down. The way to meet this, if possible, is close planting, not further apart than four feet, and pruning.

185. In Assam old teak is found in a number of stations, as for instance in Gowhatty, which is situated immediately on the banks of the Brahmaputra on a granitic substratum covered by a soil consisting of loam and clay. The oldest teak trees are said to have been planted in 1836, and consequently now 37 years old.

The following are the measurements of the more conspicuous trees:—

Number.	Girth at 4′ above the ground.	Length of bole.	Estimated cubical content of bole.	Height of tree.	Remarks.
1	13′ 1″	...	20	From 30′ to 50′	No bole at all below, divided at 9′ 6″ into four branches, of which one gives a bole of 6′ 8″ girth and 15′ length; the other bad.
2	8′ 9″	...	10		At 4′ 3″ divided into two branches, of which one gives a bole of 5′ 6″ girth and 10′ length. This tree is bad in every respect.
3	8′ 7″	12′	20		At 4′ 6″ divided into two branches, one being a straight continuation up to 12′ in all, and 5′ 7″ girth. Badly shaped.
4	8′ 6″	15′	35		Very much fluted; at 10′ several side branches, and stem falling off considerably above that.
5	8′ 3″	9′ 6″	25		Divided at 5′ 8″ into two branches, one being a straight continuation of lower stem. Badly shaped, fluted.
6	7′ 2″	20′	25		At 10′ divided into three branches, of which the centre one is a straight continuation of the lower stem. Upper half of bole only one-third the girth of lower half. Stem fluted, but not very badly.
7	6′ 11″	8′	20		Very badly shaped, fluted.
8	6′ 7″	18′	20		Stem straight; lower part somewhat fluted, but not badly; upper part well shaped.
9	6′ 4″	14′	18		Badly shaped, fluted.
10	6′ 3″	8′	12		Bad shape, fluted.
11	6′ 1″	13′	15		Bad shape, fluted, and falling off in girth.
12	6′	9′	15		Bad shape, fluted.
13	4′ 11″	...	.....		Originally two shoots, of which one seems to have been cut some time ago; present stem extremely inferior in every respect.
14	4′ 4″	7′	7		Bad shape and crooked.
15	4′ 1″	10	10		Ditto ditto.
Total 15	105′ 10″	...	252	...	
Average per tree.	7′ 1″	...	17	...	

From the above it will be observed that apparently teak will grow in lower Assam to a large size as far as girth is concerned, and in a remarkably short time; but at the same time the stems of the present trees are of an extremely inferior shape, and it is doubtful whether fine long stems approaching those in the teak forests of Burmah will be produced, even in well cared for and properly treated plantations.

186. The trees growing at Jaipore in Upper Assam have been mentioned in paragraph 166, and also the unhealthy state of the trees in the Makoon plantation, making it very doubtful whether teak will thrive in Upper Assam.

187. The climate of the above localities differs not only in one place from that in the other, but also from that in localities where teak is known to thrive. The following table gives rainfall and temperature for Rangoon, Patna (Bankipore,) Gowhatty, and Debrooghur :—

Name of Station.	Rainfall.	Temperature.		
		Annual mean	Mean during November to February.	Actual minimum.
	Inches.	Degrees.	Degrees.	Degrees.
Rangoon	85	79	77	59
Patna	45	77	65	38
Gowhatty	63	76	67	48
Debrooghur	117	73	63	...

In Patna the rainfall is about half that in Rangoon, the mean temperature from November to February is twelve degrees, and the actual minimum twenty-one degrees lower, and nevertheless teak is not interfered with in its vitality at Patna. The rainfall at Gowhatty is about three-fourths that of Rangoon ; the winter temperature is ten degrees, the actual minimum eleven degrees lower than that at Rangoon, and teak grows in a manner slightly inferior to that at Patna. At Debrooghur in Upper Assam, on the other hand, the rainfall is considerably higher than at Rangoon, the winter temperature at the same time 14 degrees lower, and the consequence "appears" to be a cold dampness which interferes with the vitality of teak. Whether the latter is the case, or whether the dying off of the young teak at Makoom is caused by the attack of insects or other animals, rats, will have to be ascertained by closely watching them.

188. To sum up now, it may be said, teak of inferior and moderate quality can be produced in the Bengal plains, Behar, and in Lower Assam, but there is no proof as yet to show that superior teak can be produced in the Sikkim terai or in Lower Assam, and in Upper Assam it appears doubtful whether it will thrive at all.

189. *Mahogany.*—This tree grows well in the Bengal plains, where large specimens are found in different localities. Whether it will grow in Assam appears doubtful. A number of seedlings have been planted out this year at Bamunpookree, but nothing can be said of the result as yet.

190. *Caoutchouc.*—India-rubber trees grow in all parts of Bengal, but luxuriantly only in the moist forests along the foot of the hills and lower parts of Sikkim, Bhutan, Assam, Cachar, Munipore, Lushai country, and most likely Chittagong. It is also found in large numbers east of Assam in Burmah. The most favorable province in India appears to be Assam, especially on the lower hills in the east and north of that country. Up to the present only small experimental plantations have been made, but a plan of establishing them on a large scale is now under discussion. The site proposed for rubber plantations in the first instance is the Chardooar forest situated just under the foot of the Himalayas and about 25 miles north-west of Tezpore. The area available amounts to 200 square miles covered with dense evergreen mixed plain and lower hill forest.

191. Regarding the mode of planting, different views have been advanced. Dr. Henderson, Superintendent, Botanic Gardens, Calcutta, proposes to plant caoutchouc 15 feet by 15 feet, three cuttings to be put in each planting spot. This would make 225 planting spots, or 675 cuttings per acre. At the age of 5 to 15 years, according to circumstances, tapping is to begin, each alternate tree to be tapped until it dies, leaving a plantation of 30 by 30 feet containing 48 trees per acre, which are to remain and supposed to yield "as the very minimum" Rs. 5 each tree, or at the rate of Rs. 240 per acre per annum. Mr. Mann,

on the other hand, proposes to clear lines 20 feet broad, 100 feet apart from centre to centre, and to plant cuttings 50 feet apart in the lines, or nine trees per acre. As soon as the trees close up, every alternate tree in the lines is to be tapped until it dies, leaving four to five trees per acre.

192. It appears to the Conservator that the best method is likely to be found between the two mentioned above. He would propose that lines 50 feet apart be cleared 10 to 20 feet broad, the trees to be cut and pushed to the uncut portion (proposed by Mr. Mann), and that the India-rubber be planted 25 feet apart in the lines. This would give 35 trees per acre. As soon as they begin to close up, every alternate tree in the lines should be tapped until it is dead, leaving a plantation 50 feet by 50 feet or 17 trees per acre. These distances have been derived from the size of a tree at Jaipore, the age of which was given as 18 years. This tree occupied an area of 2,500 square feet, or just what has been proposed above, and from its appearance there seems to be no doubt that closer planting will entail an expenditure out of proportion to the very doubtful increase of returns. If we plant 15 feet by 15 feet, the whole area must be taken in hand, whereas in the other case we have to look only after two-fifths of it. The large trees now found which yield Rs. 5 per annum occupy from one-fourth to one acre of ground each, and there is no doubt that Dr. Henderson's estimate of a return of Rs. 240 per acre per annum is far too high. In the Conservator's opinion the return cannot safely be put down higher than Rs. 20 per acre per annum, beginning from 10 to 15 years after planting. Tapping trees at a very early age will not prove an advantage, as they will cease to grow as soon as they are being tapped. It will be found preferable to allow them to grow to a certain size first, and for this reason there will be no advantage in planting closer than 50 feet by 25 feet. Mr. Mann proposes to plant the trees within the cleared strip of 20 feet on alternate sides. It will be better, however, to plant them in a straight line in the centre.

193. India-rubber can be raised from seed or cuttings. The latter system gives us at once a tree some 5 or 6 feet high, which is not likely to be smothered by grass and jungle, but if the plantations are to be carried out on a large scale, it will be questionable whether a sufficient number of trees fit to yield all the cuttings and within a reasonable distance will be found. Moreover, trees which are used for the production of these cuttings cannot be tapped at the same time, which loss of revenue will have to be put down against the cost of the plantations. Another point is whether trees from cuttings will produce such fine trees as those from seed. Judging from the general character of fig trees, the question might be answered in the affirmative; but still there is no absolute certainty, as our present large trees in the forests have all grown up from seed. Under these circumstances it should be taken into consideration whether it would not be preferable to establish regular nurseries, in which the seed is first sown in carefully prepared seed-beds, transplanted into a nursery as soon as it is about three inches high, and allowed to remain until it has attained a height of (say) 2 to 3 feet, when it is planted out in the forest. On the whole the Conservator is rather in favor of the last mentioned method; but until the saplings become available, cuttings must be made use of.

194. Regarding the cost of the plantations nothing definite can be said at present. Mr. Mann estimates the cost of his plantations at about 13 annas per acre, but that is evidently altogether under the mark. The Conservator does not think the plantations, as proposed by him, can be made at the outset for less than Rs. 20 per acre; but after the work has been started in a systematic way, the expense ought to come down to Rs. 12 or 10 per acre.

195. The area to be planted per year is regulated by the amount granted for the purpose. During the first year a limited area only, say 100 acres, should be taken in hand, with the view of avoiding waste of money, which will always take place to some extent on starting operations, and in order to prevent a break down of the whole by starting on too large a scale at once. In the second year the area to be planted should be regulated by the experience gained during the first, and by degrees it may be extended as much as appears advisable.

196. The most difficult point will be the labor question. In Upper Assam local labor is not available, or on a very small scale only. In Lower Assam Mr. Aylmer has succeeded this year in making upwards of 30 acres of teak and smaller areas of rubber, toon, and sissu plantations entirely by local labor. This officer was the first who succeeded in Burmah in drawing local labor to the teak plantations by paying the current daily rate to every cooly who came, and by giving the men perfect liberty to go again when they liked. During the present year he has adopted the same system in Assam, and the result is that he has quite as much labor as he wants; in fact, the men are only afraid of being discharged for want of work. It is true that the happy way in which Mr. Aylmer treats the men has much to do with his success, and perhaps not every officer would be equally successful. It is believed that local labor is available in the Durrung district, and Mr. Mann appears to think that the plantation work can be done without going to the necessity of importing labor.

197. Dr. Henderson is now trying to obtain plants and seed of *Siphonia elastica*, the plant which furnishes the greater part of the South American rubber, believed to be superior to Assam rubber. Until this species has been successfully introduced, however, we shall have to do with our own *Ficus elastica* only. Next year, it is hoped, will find the work fairly started.

SECTION V.

Yield of the Forests.

198. The timber operations of the Forest Department during the year have been trifling.

In *Cooch Behar* one sal log, 35 small logs, 302 sleepers, and 517 planks and scantlings, measuring 1,055 cubic feet in all, have reached the station depôts during the year. The fact is that more timber than could be sold has been cut and brought out in former years, and during the present year it was resolved upon first to clear out the timber already on hand before investing further money. With this object 845 sal logs, 251 small sal logs, 200 logs of temperate trees, 6 sleepers, and 288 planks and scantlings were sold off. There are now still—

6,821	logs,
217	small logs,
25,475	sleepers,
737	planks and scantlings,
Total ... 33,250	pieces,

lying partly in depôts and partly scattered about the forests. The timber from temperate trees near Darjeeling is being sold off by auction at the rate of about 100 logs per month. The greater portion of the sal timber, it is expected, will be taken by the railway authorities for the Darjeeling line, if it is to be commenced. The logs lying in the Buxa forest will gradually be carried to Alipore and sold by auction. For this work three elephants have been applied for.

199. The results of auction sales of timber from temperate trees are not satisfactory, but it should be taken into consideration that the timber is old and partly rotten, and in addition the so-called "sirdars" have evidently combined to obtain the timber below the real value. The only way to meet this combination is to stop the sale of standing timber until the material in the depôts has been disposed of. If the auctions are held periodically, the combination is sure to break up, and in fact signs to this effect were visible at the last sale. The following table shows the prices obtained :—

Auction held in	February,	Rs.	0	0	11	per cubic foot.	
„	„ May,	„	0	1	7	„	„
„	„ June,	„	0	1	1	„	„
„	„ July,	„	0	1	7	„	„

The logs sold at the first auction were of very inferior quality. The expenditure incurred in bringing the logs to depôt has not been covered, there being a loss of Rs. 841-3-11 on the 400 logs sold, due almost entirely to the

unfavorable results of the first sale. It will be advisable to go on with the sales, as the timber will otherwise be destroyed altogether.

200. The auction sales of sal in the Western Dooars have been more favorable as will be seen from the subjoined data:—

Quantity sold	..	..	12,917 cubic feet.
Amount realized	..	..	Rs. 9,156 0 0
Total expenditure	..	..	„ 6,509 0 10
Net surplus ..	..	..	„ 2,646 15 2
Or per cubic foot	..	..	„ 0 3 3

This timber has all been dragged by coolies to the floating creeks or the cart roads. If the elephants applied for are sanctioned, the net proceeds from the remaining logs will be considerably higher.

Assam.

201. In Assam 50 sal logs and 191 other logs were brought to depôt. The sal logs, measuring 780 cubic feet were cut in the Kamroop open forests and brought into depôt at Gowhatty by a contractor for Rs. 0-8-10 per cubic foot. They were sold by public auction and fetched Rs. 0-15-2 per cubic foot, leaving a net surplus of Rs. 0-6-4 per cubic foot. The same contractor undertook to deliver an additional hundred logs, but failed to do so for want of elephants. These logs are now being dragged to the river by Government elephants.

202. The 191 logs from the evergreen forests in Upper Assam form part of a number of logs cut some four years ago. They were brought to depôt by departmental agency; 70 nahor, 59 ajhar, and 345 other logs, or 474 in all, were sold during the year. This closes the experimental timber operations in Upper Assam, the results of which show that the price of timber other than sal is too low to make the working by departmental agency remunerative. The total loss on the operations amounts to Rs. 2,839-0-5.

Chittagong.

203. No operations have been carried on by departmental agency. Regarding the quantities of material removed from the forests by purchasers, the Commissioner writes as follows:—

"Regarding the yield of the forests, it has been reported that 1,056 tons of timber in logs have been brought out of the forests against 433 tons during the previous year, showing an increase of 623 tons; in boats 1,089 tons against 244 tons during the preceding year, likewise showing an increase of 845 tons; whilst in beams and planks the outturn of the year of report is only 19 tons against 841 tons in the previous year, exhibiting a decrease of 822 tons. The total yield of timber from the Government forests this year is 2,164 tons against 1,518 tons of the previous year.

"There is likewise an increase in the quantities of all kinds of minor forest produce, including house-posts and saplings, which have risen from 8,306 last year to 9,321 this year.

204. "The Assistant Conservator desires to include *krug* and *patti* leaves and *gurjun* oil in the list of taxable articles. The Deputy Commissioner is however not prepared to support the addition of any fresh articles of taxable forest produce to the schedule already prescribed, as the system at present prevailing of granting leases of the forest products of specified tracts of land already realizes, or should realize, the Government dues on the articles in question.

205. "Mr. Davis says that the practice of taking tolls on the forest produce brought down the different rivers is by far the most practicable and economical means of realizing revenue. He adds—"during the last two months, in addition to the original toll stations, collectors have been appointed on commission to collect tolls on the following small streams, viz. Surta, Droong, Kallapanea, Issamuttee, Shilock, Doloo, Hunger, and Tankwattee. It is likewise proposed to adopt the same course on the Eadgong, Rezoo, and Naaf; but suitable and reliable agents have not yet presented themselves as candidates."

206. "The Deputy Commissioner is much averse to this supplementary plan. He is of opinion that the collecting of any tax "on commission" cannot fail to be the cause of great inconvenience and grinding oppression to the people at large, unless the collectors are men of well-known probity and position; and even then the Deputy Commissioner would regard this mode of collection as a *pisaller*, an alternative only to be resorted to when all other means failed.

207. "I (the Commissioner of Chittagong) am not disposed to attach much weight to the objections raised by the Deputy Commissioner. They would be equally valid if raised in connection with every system of collections in which native agency has to be employed. The Deputy Commissioner apparently forgets that the system he inveighs against is very much in vogue in the management of our khas mehals, and has not been found in practice to be attended with the 'grinding oppression and inconvenience' that he apprehends. It is in fact the best and readiest means of ascertaining the amount and value of any particular trade or traffic, and in this view I propose to continue the system for the present year. Care, of course, is necessary in the selection of agents or tehsildars, the importance of which the Assistant Conservator appears fully alive to. The Mong Rajah has been appointed to collect on the Surta, Halda, and Kalapanea; a nominee of the Mong Rajah, for whom the latter is surety, has been appointed for the Doloo, Hunger, and Tankwatee; whilst for the appointment for the Silok and the Issamuttee no satisfactory arrangements have as yet been made."

Chota Nagpore.

208. An attempt was made during the year to float sal timber from the Sarunda forests down the Brahmini River to Cuttack; but as the results have been mentioned in the resolution on last year's report, it is unnecessary to enter here upon the subject. The Conservator will, however, take up the question again when he visits the Chota Nagpore Division.

209. The exact quantities of material removed from the forests by purchasers cannot be given, as the data for Assam and Dacca are not available. Those for the former province for 1873-74 will be given, but no arrangements have been made as yet to obtain similar data from the Dacca forests.

From the forests of Cooch Behar and Chittagong the following material has been removed by purchasers:—

Cooch Behar Division.

Name of trees.	Number of trees or pieces sold.	Amount realized.	Average amount per piece.	Remarks.
Sikkim Sub-Division.		Rs. A. P.	Rs. A. P.	
Champ (green)	46	512 0 0	11 2 1	
Katoos „	25	218 0 0	8 11 6	
Chalownee „	1	12 0 0	12 0 0	
Book „	11	118 0 0	10 11 8	
Sal „	142	1,422 0 0	10 0 2	
Toon „	18	188 0 0	10 7 1	
Sissu „	2	20 0 0	10 0 0	
Miscellaneous green	...	80 0 0	.....	
Firewood (green and dry)	...	336 0 0	.....	
Western Dooars.				
Sal (green)...	339	1,052 0 0	3 1 7	334 of these were young trees under 4' 6" girth.
Kala Khumbas (dry)	4,678	2,666 8 0	0 9 1	
Champ goals (green)...	2	5 0 0	2 8 0	
Sal (green)	24	84 0 0	3 8 0	
Firewood (dry)	...	1 4 0	.....	
Total ...	5,288	6,714 12 0	...	
Deduct—				
Amount due but not realized during the year ...	.....	240 0 0	.....	
Balance ...	.....	6,474 12 0	.....	
Add—				
Amount realized on account of former years ...	.....	30 0 0	.....	
Total shown as revenue in Form No. 21, under II. ...	.....	6,504 12 0	.....	

Chittagong Division.

Description of material.	1871-72.	1872-73.	Increase.	Decrease.
	Tons.	Tons.	Tons.	Tons.
Timber in logs	433	1,056	623	.....
,, boats	244	1,089	845	.....
,, beams and planks	841	19	.....	822
Total ...	1,518	2,164	646	.....

210. *Caoutchouc* is collected by direct Government agency in *Cooch Behar* only. During the year 1871-72 the collections amounted to 349 maunds 10 seers, and the cost of collecting to Rs. 10 per maund. In September last the Deputy Commissioner of Darjeeling sold the right to collect on the left bank of the Teesta for Rs. 3,400, leaving to the Forest Department only the right bank of the Teesta. The result is that the collections of the present year amount to 57 maunds 2 seers only, and the cost of collection has moreover risen to Rs. 16 per maund. The fact of the collections being made by two different parties multiplied opportunities for theft, which were made use of to the fullest extent. During the coming season it is expected the Forest Department will be the sole collector.

211. The estimated amount of India-rubber brought into the Calcutta market from British and Independent Sikkim stands as follows:—

In 1871	... ...	600 maunds.
,, 1872	... ...	490 ,,
,, 1873	... ...	700 ,,

212. The rubber mehals in *Assam* have not been sold during the year, but the collections of rubber have been going on all the same, except in the vicinity of the head-quarters of the civil officers. The following is an estimate of the quantities brought into the Calcutta market:—

In 1870	... ...	7,500 maunds.
,, 1871	... ...	12,000 ,,
,, 1872	... ...	21,000 ,,
,, 1873	... ...	11,000 ,,

up to the 1st August.

213. A good deal of rubber is brought from Cachar, but the quantities cannot be given.

SECTION VI.

FINANCIAL.

214. The budget estimates for the year 1872-73 were—

	Rs.
Receipts	1,25,000
Expenditure	1,37,000
Deficit	12,000

The actuals of the year are—

	Rs.
Receipts	1,49,852
Expenditure	99,617
Surplus	50,235

These sums include collections by civil officers amounting to Rs. 51,568, and expenditure by civil officers amounting to Rs. 5,131. If the accounts of the forest officers are taken separately, they stand as follows:—

	Rs.
Receipts	98,284
Expenditure	94,486
Surplus ...	3,798

The net result of the year's transactions amounts to Rs. 39,986, the particulars of which are given in (revised) Form No. 28.

215. These figures compare favorably with those of last year:—

	Rs.
Collections in 1871-72	1,39,089
Ditto in 1872-73	1,49,852
Increase in 1872-73	10,763
Expenditure in 1871-72	1,08,339
Ditto in 1872-73	99,617
Decrease in 1872-73	8,722
Surplus in 1871-72	30,750
Ditto in 1872-73	50,235
Increase in 1872-73	19,485

If the collections and expenditure of forest officers only are taken into account, the deficit in 1871-72 amounted to Rs. 20,779, whereas in 1872-73 the department paid its own expenses and realized a surplus of Rs. 3,798. The collections by civil officers in 1871-72 amounted to Rs. 60,529, and in 1872-73 to Rs. 51,568; decrease in 1872-73, Rs. 8,961.

A new method of calculating the value of the year's transactions has been introduced this year, and a comparison of actual profits does not give a fair idea of the respective merits of the two years' transactions. The net profit in 1871-72 was calculated to amount to Rs. 31,429, and in 1872-73 to Rs. 39,986, leaving in favor of the year Rs. 8,557.

216. The contributions of the several divisions differ considerably. In the subjoined statement the expenditure of direction has been distributed equally, and that of the office of forest accounts according to the expenditure in the several divisions:—

Name of Divisions.	Receipts.	Expenditure.	Surplus.	Deficit.
	Rs.	Rs.	Rs.	Rs.
Cooch Behar	55,111	35,073	20,038	.....
Assam	18,354	28,577	.....	10,223
Dacca	14,746	8,410	6,336	.....
Chittagong	61,400	15,504	45,896	.....
Bhaugulpore	241	12,053	.....	11,812
Total ...	149,852	99,617	50,235	.....

The Chittagong division yields the highest surplus, and next to it comes Cooch Behar. The former division has approached the highest yields which can be expected for the present. The receipts of the Cooch Behar division are expected to rise steadily for some time to come. In Assam not all forest produce is credited to "Forests," as for instance the returns from soom trees,

otherwise the division would show a considerable surplus. During the present year the rubber mehals were not sold, which caused also a loss of revenue. The Bhaugulpore division has been closed for the present.

217. The outstandings of the department at the commencement of the year amounted to Rs. 18,475, and at the close of the year to Rs 11,927. This latter amount, it is expected, will be adjusted during the year 1873-74, but some of the old items will have to be written off as irrecoverable. The details will be laid before Government in a separate communication.

218. It is a recognized principle over all the forest divisions of Bengal that the people inside and immediately around the open forests shall obtain their domestic requirements of forest produce free of charge; it naturally follows that the sales of timber and fuel must be limited, and consequently the receipts under these headings are not likely to rise to any considerable amount, if not exceptional circumstances, as the construction of railways, happen. On the other hand, many of the forests are capable of yielding large returns from minor forest produce, and in this manner the revenue is likely to rise in future years. The treatment of the Sunderbun forests will now soon be decided on, and it is expected that an additional revenue of one and a half or two lakhs will be obtained, so that, all circumstances considered, the financial prospects of the department are good.

SECTION VII.

General.

219. *Elephants.*—Most of the Government forests on the northern and eastern frontier are exceedingly inaccessible, and without elephants forest officers are almost incapable of visiting the greater portion of the area. Too great economy in providing these animals is therefore false economy; and again timber works cannot be carried on successfully in Bengal without dragging elephants. For Assam a sufficient number (eight) of elephants has now been provided. In Cooch Behar we have upwards of 6,000 seasoned logs in out-of-the-way depôts and in the forests, which cannot be brought to market without elephants, and an application for three more animals is now before Government. In Dacca and Chittagong we have no elephants at all. For Dacca two have been applied for, and Chittagong should be supplied with two more. It is sincerely expected that sanction for five additional elephants will soon be accorded.

220. *Survey and working plans.*—The Government of India have during the past year created a separate branch of the Forest Department, the survey and working plan branch, withdrawing at the same time all credits for these purposes from the provincial budgets. Although the Conservator agrees with the principal that this class of work should be carried out according to fixed rules and in a systematic manner, and that more satisfactory results are obtainable if the direction rests in one hand; still he believes that the measure as put into practice is too sweeping, and likely to interfere seriously with the progress of administrations in several provinces. The special branch is now at work in the North-Western Provinces and in the Punjab. After the work has been completed in these provinces, Burmah and the Central Provinces are to be taken in hand. Any one who knows the time required for that class of work must be convinced that the provinces under the Government of Bengal have no chance of seeing the work commenced for ten years to come at least, during which time we are, as it is, condemned to work on in a rough sort of way. Moreover, what we require for the greater portion of the Indian forests at the present moment are simple working plans (to be followed hereafter, if necessary, by more elaborate plans), the compilation of which requires comparatively little time.

The selection of reserves, too, has to be accompanied by a certain amount of surveying, and for both these purposes it is necessary that a small credit should be granted annually. As it is, the selection of reserve in the Dooars and

in Assam has already been seriously interfered with, and it is to be hoped that the Conservator of these provinces may be entrusted with a limited credit for next season's work.

221. *Conservator's tours.*—The present Conservator assumed charge on the 2nd December 1872, and on the 31st of the same month he proceeded to Sikkim, examined the terai and a small portion of the hill forests, drew up instructions regarding the work to be performed, and proceeded to the Western Dooars. Here he examined the sal forests, introduced the two junior assistants, Messrs. Fisher and Johnstone, to the work, and issued instructions on future operations. The Conservator proceeded next to Patna, Arrah, Gya, Shergotty; thence to Palamow, examined the greater portion of that district, proceeded through a portion of the Hazareebaugh district, and returned to Calcutta in the beginning of April. On the 27th of April he left for Assam, visited the sal reserves in the Kamroop district, the plantation on the Kulsi, the Jeerung forest, and a portion of the Khasi Hills. He next proceeded to Debrooghur, marched to Jaipore and Makoon, examined the experimental teak plantation, and returned to Calcutta, which he reached on the 24th July 1873. His report on forest operation in Assam is now before Government.

222. It will be observed that the Conservator's endeavours during his first season in Bengal were to bring the work in the Cooch Behar division on a proper footing and to advise on forest operations in Assam. During the next season he proposes to introduce forest conservancy into the Dacca division, the Garo Hills, and the Eastern Dooars; after which a visit to Chittagong will most likely be found advisable. The Sunderbuns, if taken under management, will also be visited during the year. The western districts, it is expected, will be taken in hand the following year.

Programme of Work in the established Divisions.

223. *Sikkim sub-division.*—All the reserved forests will be examined in detail and classified. A description of each reserve will be compiled as in the appended sample, Appendix D.

The forests will be made accessible. At present many of the tracts in the plains can only be approached on elephants. Roads and paths to and through the forests have to be made. This work will be done so as to divide the forests at the same time into compartments.

Jungle fires do not at all or extremely rarely occur in the upper hill forests, moderately frequent in the lower hill forests, and they are very common in the plain forests. In fact, fires overrun the latter year after year, destroying and injuring endless numbers of seedlings, and causing many of those which survive to grow up into diseased and hollow trees.

An earnest attempt will now be made to keep them for a number of years out of the sal-bearing tracts in the terai, the beginning to be made in the Mahanuddy range.

The cattle grazing will have to be regulated so as to cause the least possible damage. From tracts protected against fire cattle must be excluded altogether.

The sal tracts in the terai must all be cleared of creepers.

The timber operations will be limited for the present to the bringing to market the logs which have been cut some years ago.

The India-rubber trees in the Government forests of Sikkim, it is expected, will be tapped under the direct control of the department.

Plantation operations will be concentrated at Bamunpokree, where teak, toon, sal, mahogany, baobab, and India-rubber will be planted.

224. *Western Dooars.*—The work of selecting reserved tracts has been commenced in Mooraghat, and it will be continued in the Minapooree, Lukeepore, Boraghar, Satalie, Buxa, and Bholka forests. As soon as the work has been completed in one pergunnah, the tracts selected and approved of by the civil authorities should be made over to the Forest Department to be treated in the manner mentioned above in the case of the Sikkim reserves.

The timber operations will be restricted for the present to the bringing out of the logs cut some years ago, the number of which amounts nearly to 3,000.

No plantation operations are to be commenced at present.

Assam.

225. The Conservator has proposed that the following works be taken in hand:—

Gowhatty sub-division.—Demarcation, examination, and description of sal reserves; preparation of preliminary working plan; further selection of sal reserves in the Jeerung forest and of patches along the foot of the hills from the Goalpara to the Nowgong boundary; creation of 50 acres per year of teak, toon, sisu, and sam plantations, also caoutchouc plantations on a limited scale; working of the sal reserves according to a plan to be compiled, partly by selling the timber in the forests and partly by bringing it to market on Government account; protection of sal reserves against fire, and cutting of creepers.

226. *Tezpore sub-division.*—Demarcation, examination, and description of reserves; caoutchouc plantations on a large scale in the Chardooar reserve, 100 acres during the first year, and gradually to be increased to any extent prescribed by Government.

227. *Nowgong sub-division.*—Demarcation, examination, and description of reserves; further selection of sal reserves along the foot of the Khasi Hills; protection of sal reserves against fire, and cutting of creepers on sal trees.

228. In the *Seebsaugor district* the selection of reserves and examination of the soom forests should be proceeded with.

229. The Commissioner of Assam, in forwarding the divisional report, makes the following remarks:—

"To determine what scope forest conservancy should have in Assam, the nature of the actual forest growth must be well understood. We must picture to ourselves a large tract of country thinly peopled, and therefore but partially cultivated; the cultivation of two kinds, wet land cultivation on ground which in its natural state is covered with reeds and gigantic grasses, and this cultivation only is permanent; and high land cultivation, which, except in the case of tea, is constantly shifting and breaking up fresh ground; so that, though the actual quantity of land occupied at one time may be comparatively small, the quantity which has been denuded of its forest growth within a period too recent to allow of the full recuperation of such growth, represents the occupancy of a dense population. So while there are few timber trees that do not require more than half a century for their development, the portions of forest that have been untouched in Assam for half a century and upwards are few and far between; and hence, when a forest area of 4,000 square miles is estimated for Assam, it must be remembered that the greater part of this is what a forester would reckon to be mere rubbish. There is further some reason to suppose that Assam is not naturally very prolific of trees valuable in their primary use as timber; and in this respect the province contrasts most unfavorably with British Burmah. Sal, which is confined to the lower districts of Assam, is pretty well the only really first-class timber tree we have; while in British Burmah, setting aside teak, there are many sorts of timber trees quite entitled to be reckoned first-class; some even superior to sal, though they have failed to obtain repute from having to sustain competition with teak. It would seem that the soil and climate of Assam were more favorable to trees having secondary uses, valuable not for what could be made directly with them, but for what could be got out of them—what they yielded—as tea, caoutchouc, the trees that feed the lac insect or the silk worm. Again, in certain parts of Assam the conditions of soil and climate appear so favorable to the growth of first-class timber trees, that their present scarcity is not of itself sufficient to discourage attempts to plant and propagate them.

230. "I should read Mr. Mann's report, then, in the light of the ideas which have suggested the foregoing remarks; and to begin with, they explain the policy of conservancy that has been pursued, namely, to reserve, and reserve strictly, what we could find of really merchantable timber growth; and to leave the rest to the uses of the local population, controlling them so far

as might be to their greatest benefit; as for instance while allowing ample areas for 'jooming,' restricting 'jooms' in the vicinity of towns or comparatively well-peopled localities, where the supply of fuel was more necessary to the people than the 'joom.'

231. "Mr. Mann reports that forest administration may be said to have advanced a step during the year: and I think it has, and a considerable one. Matters have been got into something like working order. The subordinate Forest officers have been no longer vaguely employed, but have had plenty of occupation assigned them with a definite end; and in the large area of forests that have been demarcated, we have really something to show. Then in the teak nursery on the Koolsee a foundation for plantations has been laid, which may be carried on to any extent; and we have been able to design the Koolsee as a centre for forest operations of every kind. It is situated on the best sal reserve; and we have a tract near it suitable for the experimental cultivation of the caoutchouc; and we propose that it should be the head-quarters of the Lower Assam Forest officer."

Chittagong.

232. The Commissioner writes as follows :—"The Assistant Conservator of Forests has made the following general remarks: 'We have now arrived at a fair knowledge of what we possess in the shape of forests; and, with the exception of the Fenny and Lushai country, we know exactly what we have left; and it remains now to be decided what course should be adopted as the most suitable to the people, country, and the interests of both. We have an enormous demand on our forests both for timber and other forest produce; and we must make our existing stock last as long as it can with as little hardship as possible to the inhabitants, both of the hills and the adjoining districts. I have shown what my views are with regard to the forests, and it remains to be decided what action should be taken.

233. "'We are as yet without any rules or regulations of any kind. It is only reasonable to ask for rules that can really be of service. One code for a whole province is, I submit, detrimental to the working of all divisions save the one it was drawn out to suit. The country products and people in this division are vastly different to any other, and require special rules and an entirely different system of working as regards details; though the great aim and objects of the whole undertaking are identical. What we require at present are effective rules for the better management of the tolls with power to regulate the size and quantity of timber to be felled in any fixed locality, as also rules for the protection of plantations from cattle-trespass. The whole matter of rules is dependant on the action taken with regard to reserves; and therefore, until definite orders are passed on that subject, it would be premature to prescribe rules.

234. "'Of the establishment under me, I have only to say that I have had opportunities of watching the working of the Chunderkonah toll station—the largest of the stations—and I am satisfied that very little (if any) malpractice is carried on. There may be a little petty larceny which is difficult to detect, but I do not think more than would exist under the best paid and supervised staff.'

235. "The Deputy Commissioner observes the working of the division from a financial point of view is most satisfactory. From an administrative point of view, however, I regret to state that the aspect of affairs does not seem to me altogether bright. As I have previously pointed out in this letter, we are making a great money profit now at the expense of the future; and I would prefer to see the receipts less, and the expenditure in reproductive works and duties of supervision more.

236. "Captain Lewin (the Commissioner writes) is evidently unaware of the state of affairs in the current year, and of the progress that is taking place in the matter of plantations. A sum of Rs. 6,000 has been sanctioned for expenditure under this head during the current year, whereas in no previous year has the sanction exceeded Rs. 1,000. By way of illustration, I may

mention that, whereas 13 acres were planted out last year, the area planted out during the current year will probably exceed 100 acres; besides which the vacancies in last year's plantations will be filled up. In conclusion I have to recommend for the present year a policy of complete inaction. I recommend that nothing whatever be done, but that we rest on our oars, and watch the working of the department for another year. So far it is working smoothly, prosperously, and well; and in recommending inaction, I am simply advocating leaving well alone."

The Conservator's opinion is that forest matters in Chittagong require a thorough investigation.

237. *Office of Forest Accounts.*—Since Mr. Home assumed charge of this branch of the department, its working has been satisfactory, and the accounts of the current year have been brought to agree with those kept in the Accountant-General's office—a success which, it is believed, has never been achieved before. As long as a fully competent officer is in charge of the forest accounts, it is all well and good; but unfortunately this is not always the case; and the responsibility resting on the Conservator of Forests, gives him a great deal of anxiety. In a large charge like this, where he has to travel over immense distances, and to be absent from head-quarters about nine months in the year, he can hardly do justice to the accounts. It would lead too far to enter here upon the reasons which led to the establishment of a separate office of forest accounts, and to the audit being given to the Conservator of Forests; but there are serious doubts whether the present arrangement answers well. In fact it would be only fair to the Conservator to adopt one of the following two plans:—

(1) To appoint a special accounts officer to the Forest Department, to make him directly responsible for the correctness of the accounts, and to arrange for a periodical inspection and examination by the Accountant-General or his assistants; or

(2) To hand back the audit to the legitimate controller—the Accountant-General.

The Conservator of Forests is of opinion that the drawbacks which led to the abandonment of the second system are to be found not so much in the faultiness of the system itself as in the manner in which it was worked in practice.

238. *Services of officers.*—Most of the officers of the department have worked well during the year. Mr. A. L. Home, Deputy Conservator of Forests, on joining these provinces early in December, assumed charge of the office of Forest Accounts, and he also examined the Sunderbuns. He has done full justice to his reputation as a most useful and hard-working officer.

Captain Losack, Deputy Conservator of Forests, also has worked very hard to bring the Cooch Behar division into proper working order.

Mr. G. Mann, Assistant Conservator of Forests, 1st grade, returned from sick leave in January, and assumed charge of the Assam division, where he has set to work with great energy.

Of Mr. Davis, Assistant Conservator of Forests, the Commissioner of Chittagong writes that "he has given complete satisfaction in the discharge of his duties, and that he considers him an intelligent, hard-working, and zealous officer."

Mr. A. P. Aylmer has done good service during the year. He selected several reserves in a judicious manner, and he deserves great credit for the successful manner in which he has started forest plantations in Assam.

Mr. J. S. Gamble has done a very creditable piece of work in the examination of the Mahanuddy terai range, the report on which is appended to this report. He promises to become altogether an excellent officer.

The two junior assistants, Messrs. Fisher and Johnstone, who arrived in December from England, have taken kindly to the work, and demarcated and surveyed the proposed reserves in Mooraghat to the satisfaction of the Conservator. They are now occupied in studying the vernacular.

Form No. 21.

FOREST DEPARTMENT, BENGAL.

Annual summary of Revenue and Expenditure in the several Divisions during 1872-73.

Classification.	Direction.	Cooch Behar.	Assam.	Dacca.	Chittagong.	Bhaugulpore.	Total.
Receipts.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
I.—Sale of timber brought to depôt by Government Agency	.....	22,691 9 0	2,153 10 0	.....	.....	.....	24,845 3 0
II.—Ditto firewood and charcoal, removed by purchasers	.....	6,504 12 0	.....	.....	.....	.....	6,504 12 0
III.—Duty on foreign timber	.....	.....	.....	.....	.....	.....	.....
IV.—Permit fees, rent from squatters, &c., (includes Civil Officer's collections)	116 12 9	16,883 7 9	16,119 13 0	14,739 6 3	61,400 0 3	74 0 0	1,09,333 8 0
V.—Grazing dues and fisheries	.....	710 0 0	.....	.....	.....	.....	710 0 0
VI.—Sales of fruits, babool pods, India-rubber, &c.	.....	8,233 2 7	.....	.....	.....	.....	8,233 2 7
VII.—Sale of confiscated and waif timber	.....	.....	.....	.....	.....	.....	.....
VIII.—Fines and forfeitures	.....	39 6 8	28 0 0	.....	.....	11 13 5	79 4 1
IX.—Miscellaneous receipts	37 2 0	49 0 0	52 14 0	7 0 0	.....	.....	146 0 0
Total	153 14 9	55,111 6 0	18,354 5 0	14,746 6 3	61,400 0 3	85 13 5	1,49,851 13 8
Expenditure.							
A.—Conservancy and Working.							
I.—Timber expenses	.....	4,570 1 2	732 3 11	47 5 7	.....	814 0 0	6,163 10 8
II.—Purchase of cattle	.....	5,203 4 3	2,626 9 3	29 14 0	209 8 0	98 12 0	8,167 15 6
III.—Feed and keep of cattle	.....	1,884 5 7	1,684 9 1	106 4 8	5 4 0	434 15 0	4,115 6 4
IV.—Rent of leased forest	.....	.....	2,301 13 4	.....	.....	.....	2,301 13 4
V.—Charges on collecting revenue on grass, &c.	.....	570 5 0	.....	.....	.....	.....	570 5 0
VI.—Plantations	.....	1,645 9 9	1,501 15 1	.....	809 6 3	.....	3,956 15 1
VII.—Forest work	.....	271 10 0	68 10 0	.....	225 0 0	.....	565 4 0
VIII.—Forest survey	.....	155 6 2	435 5 10	3 9 8	150 0 0	100 10 7	845 0 3
IX.—Experiments on timber	.....	23 0 0	.....	1 0 0	.....	.....	23 0 0
X.—Communications and buildings	.....	1,463 4 0	57 13 8	21 10 6	202 8 0	71 4 0	1,816 8 2
Total	.....	15,735 13 11	9,409 0 2	209 12 5	1,601 10 3	1,519 9 7	28,525 14 4
B.—Establishments.							
I.—Salaries	21,683 14 3	9,876 14 6	10,489 7 1	2,472 10 6	7,296 0 0	4,018 9 9	55,837 8 1
II.—Travelling allowances	4,871 5 4	2,762 3 11	1,801 15 9	616 4 11	1,006 15 9	914 14 3	11,973 11 11
III.—Contingencies	1,011 4 9	502 5 0	930 11 3	105 15 1	290 8 0	438 11 10	3,279 7 11
Total	27,566 8 4	13,141 7 5	13,222 2 1	3,194 14 6	8,593 7 9	5,372 3 10	71,090 11 11
Grand Total of Expenditure	27,566 8 4	28,927 5 4	22,631 2 3	3,404 10 11	10,195 3 0	6,891 13 5	99,616 10 3

Form No. 22.

FOREST DEPARTMENT, BENGAL.

Annual Abstract Account of the Cash Transactions of the Department, during the year 1872-73.

Dr. Cr.

	Rs. A. P.	Rs. A. P.		Rs. A. P.	Rs. A. P.
To cash in hand on 1st April 1872 ...	4,718 1 8		By expenditure of the Department ...	99,616 10 3	
„ Revenue received	*1,40,851 13 8		„ Remittances to State treasuries ...	1,57,382 1 4	
„ Remittances from State treasuries	96,778 1 5		„ Advances made	10,863 15 0	
„ Advances recovered	†17,712 2 10		„ Value of service books...	0 9 0	
„ Cash recoveries of service payments	4 4 0		„ Provincial Services	525 0 0	
„ Value of service books	0 9 0		„ Refund of Income Tax	1 10 0	
„ Uncovenanted Service Family Pension Fund	902 13 0		„ Cash balance in hand on 31st March 1873	2,011 14 0	
„ Income Tax	433 14 0	2,70,401 11 7			2,70,401 11 7
Total		2,70,401 11 7	Total		2,70,401 11 7

Form No. 23.

FOREST DEPARTMENT, BENGAL.

Annual Statement of Outstandings and Liabilities of the Department on Account of Contractors and Disbursers, 1872-73.

Divisions.	Department Debtor.			Department Creditor.			Balance Due.	
	At commencement of the year.	Recoveries in cash and value of supplies, and work done during the year.	At close of the year.	At commencement of the year.	Payments made during the year.	At close of the year.	To department (outstanding).	By department (liabilities).
		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
Cooch Behar	.....	9,395 0 7	9,395 0 7	14,731 7 0	2,498 13 3	17,230 4 3	7,835 3 8	.....
Assam	.....	5,987 11 0	5,987 11 0	3,556 4 3	6,003 8 6	9,559 12 9	3,572 1 9	.....
Dacca	.....	72 8 3	72 8 3	.....	84 8 3	84 8 3	12 0 0	.....
Bhaugulpore	.....	1,956 15 0	1,956 15 0	187 12 2	2,277 1 0	2,464 13 2	507 14 2	.....
Total ...	.....	17,412 2 10	17,412 2 10	18,475 7 5	10,863 15 0	29,339 6 5	11,927 3 7	.....

Form No. 24.

FOREST DEPARTMENT, BENGAL.

Statement of Timber brought to Depôt from the different Forest Divisions during 1872-73.

Name of River or division.	Forest.	Description of timber.	Pieces.	Cubic feet.	Total of each River. Pieces.	Total of each River. Cubic feet.	Remarks.
Cooch Behar..	Siligoree	Planks and scantling ...	453	175			This includes all transfers of timber into scantling, but not timber, &c., removed from one depôt to another, for which see Form No. 27.
	„	Sleepers	237	806			
	Allipore	Kala khambas	16	.....			
	Julpigoree ...	Sleepers	43	.....			
	„	Kala khambas	19	.....			
	Doodooa	Sál log	1	.....			
	Sookna	Planks and scantling ...	64	.....			
	„	Sleepers	22	74	855	1,055	
Assam ...	Nambor	Nahor logs	70	1,189			
	„	Ajhar „	19	204			
	Gowhatty ...	Sál „	50	780			
	Makoom	Miscellaneous logs ...	2	.....			
	(P)	Do. „ ...	46	1,380			
	Doyang	Do. „ ...	54	1,071	241	4,684	
		Total ...	.....	... ..	1,096	5,739	

* Of this Rs. 597-5-3 was refunded by Civil Officers.

† Includes Rs. 300 recovery of advance (in part) made by the Secretary of State, London.

Form No. 25.

FOREST DEPARTMENT, BENGAL.

Annual Timber Account for 1871-72.

Particulars.		Pieces.	Total.
I.—Stock in hand at the following depôts at commencement of the year.			
1 At Station Depôts—			
Cooch Behar Division.			
Logs	2,449*		
Sleepers	14,060		
Planks and scantling	891		
Karla khambas	337		
		17,737	
Assam Division.			
Logs		324	
2 At Forest Depôts—			
Cooch Behar Division.			
Logs	5,515		
Sleepers	11,119		
Planks and scantling	394		
Karla khambas	126		
		17,154	
			35,215
II.—Timber received at the Depôts from the Forests.			
1. At Station Depôts—			
Cooch Behar Division.			
Logs	1		
Sleepers	280		
Planks and scantling	453		
Karla khambas	35		
		769	
Assam Division.			
Logs		241	
2. At Forest Depôts—			
Cooch Behar Division.			
Sleepers	22		
Planks and scantling	64		
		86	
			1,096
Total		.....	36,311

Particulars.		Pieces.	Total.
I.—Timber removed by purchasers from Depôts.			
Cooch Behar Division.			
Logs	1,130		
Sleepers	6		
Planks and scantling	338		
Karla khambas	251		
		1,725	
Assam Division.			
Logs		524	
			2,249
II.—Timber lost and used by the Department.			
Cooch Behar Division.			
Logs		14	
Planks and scantling		727	
Karla khambas		30	
			771
III.—Stock in hand at close of the year.			
1. At Station Depôts—			
Cooch Behar Division.			
Logs	1,502		
Sleepers	14,397		
Planks and scantling	505		
Karla khambas	91		
		16,585	
Assam Division.			
Logs		41	
2 At Forest Depôts—			
Cooch Behar Division.			
Logs	5,229		
Sleepers	11,078		
Planks and scantling	232		
Karla khambas	126		
		16,665	
			33,291
Total			36,311

* 62 logs, the property of a contractor, were erroneously included with balance shown at the close of 1871-72.

NOTE.—The 1 log received in the Cooch Behar Division was found in excess at depôt by the Deputy Conservator.

The number of pieces lost and used by the Department is explained as follows:—

Of the 14 logs, 1 was used by the Department for railings, 5 were sawn into scantling, and are shown as such in the receipts in depôts, and 8 were found deficient in depôts.

Of 727 planks and scantling, 481 were used by the Department for railings and furniture, and 246 were found deficient in depôts.

30 kharla khambas were found deficient in depôts.

Total 771 Pieces.

Form No. 26.

FOREST DEPARTMENT, BENGAL.

Statement showing the amount of Revenue realized on account of the different classes of Timber sold during the year 1872-73.

Description.	Number of logs and pieces.	Average cubical contents per log.	Amount realized on account of timber sales.	Average amount per log.	Average amount per ton of 50 cubic feet.
Cooch Behar Division.			Rs. A. P.	Rs. A. P.	Rs. A. P.
Sál logs	930	27	19,977 7 0	21 7 9	38 6 8
Other timber	200	43	495 0 0	2 7 7	2 14 0
Sál sleepers	6	3	16 0 0	2 10 8	44 7 1
Planks and scantling	338		491 0 0	1 7 3	.....
Karla khambas	251		366 0 0	1 7 4	.....
Assam Division.					
Sál logs	50	15	742 8 0	14 13 7	49 8 0
Nahar „	70	17	} 699 14 0	1 10 2	5 1 2
Ajhar „	59	16			
Miscellaneous logs	290	16			
Unknown „	46	30	345 0 0	7 8 0	12 12 5
Boats	7	...	366 4 0	.....	.....
Total	2,356		23,499 1 0		
Deduct—Amount due but not yet realized			.....		
Balance			23,499 1 0		
Add—Amount realized on account of former years			1,346 2 0		
Total—Shown as revenue on account of timber sales			24,845 3 0		

Form No. 27.

FOREST DEPARTMENT, BENGAL.

Statement showing the description of work done, quantity of timber removed, and amount paid during 1872-73.

LOGS.			SLEEPERS.			PLANKS AND SCANTLING.			Total.
Description of work.	No.	Amount.	Description of work.	No.	Amount.	Description of work.	No.	Amount.	
Cooch Behar Division.		Rs. A. P.	*Cooch Behar Division.*		Rs. A. P.	*Cooch Behar Division.*		Rs. A. P.	
Carting	269	2,981 8 0	Removing ...	260	52 8 0	Sawing	627	31 10 0	
Floating	84	281 0 0	Purchasing ...	54	86 1 0	Removing	189	30 0 0	
Removing	562	656 0 0	Stacking	2,000	38 0 6				
Clearing jungle	570	126 7 8							
Allotting for auction	500	116 8 0							
Advertising	.	154 10 0							
Paint and oil		13 12 0							
Assam Division.									
Removing	195	232 3 11							
Floating	50	500 0 0							
Dacca Division.									
Collecting for auction	...	1 12 0							
Rent of timber depôt	...	45 9 7							
Bhaugulpore Division.									
Floating	*15	814 0 0							
Total... ...		5,925 7 2	Total ...		176 9 6	Total ...		61 10 0	6,163 10 8

* These logs were started from Sarunda, of which 5 reached Jailbunga.

(Revised) Form No. 28.

FOREST DEPARTMENT, BENGAL.

Annual account of Revenue realized during 1872-73.

RECEIPTS.				DISBURSEMENTS.			
	Rs.	A.	P.		Rs.	A.	P.
Amount of Revenue realized in 1872-73 .	1,49,851	13	8	Amount disbursed in 1872-73	99,616	10	3
Deduct—				*Deduct*—			
Amount realized on account of previous periods	10,260	15	1	Amount disbursed on account of transactions of former periods	3,590	3	3
Balance ...	1,39,590	14	7	Balance ...	96,026	7	0
Add—				*Add*—			
Outstandings on account of the year Rs. 5,346 2 0				Amount due for transactions during the year under review, but not yet disbursed ...	812	9	7
Minus, for bad debts	5,346	2	0				
Value of the year's transactions	1,44,937	0	7	Real cost of the year's transactions	96,839	0	7

	Rs.	A.	P.
Value of the year's transactions .	1,44,937	0	7
Cost of the year's transactions .	96,839	0	7
Balance ...	48,098	0	0
Deduct—			
Difference between the value of stock at commencement and close of the year	8,112	1	6
Net results of the year .	39,985	14	6

Explanation of difference between the value of stock at the commencement and close of the year.

	Sale value of excess stock at close of the year.	Sum required to replace deficiency at close of the year.	DIFFERENCE.	
			In favor of the year.	Against the year.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Timber, 1,641 pieces, at Rs. 5-5-6 each	.....	8,769 1 6	.....	8,769 1 6
„ 283 „ at „ 7-0-0 „	.....	1,981 0 0	.....	1,981 0 0
Other stock	2,638 0 0	.....	2,638 0 0	.....
		Total	2,638 0 0	10,750 1 6
		Deduct —Balance in favor of the year		2,638 0 0
		Net balance against the year		8,112 1 6

FOREST DEPARTMENT, BENGAL.

Area of Reserved Forests in 1872-73.

Reserved Forest.		Area in 1871-72.	Added during the year.	Total remaining in 1872-73.
Cooch Behar Division.		Square miles.	Square miles.	Square miles.
Sikhim sub-division	Hill Tracts	75	.....	75
	Teral	31	.	31
Assam Division.				
Kamroop district	Matyekar (sál forest)	.....	3¼	3¼
	Hordooar ditto	.....	23	23
	Panton ditto	.....	12	12
Nowgong district	Khalahat ditto	.....	7½	7½
	Deboka ditto	.....	3½	3½
	Mikkir Hill (mixed evergreen forest)	.....	65	65
Seebsaugor and Naga Hills district	Nambor (mixed evergreen forest)		100	100
	Total	106	214½	320½

FOREST DEPARTMENT, BENGAL.

Area of Unreserved Forests in 1872-73.

This statement cannot be prepared this year for want of data. The estimated areas in the established divisions are given below :—

	Total remaining in 1872-73. Square miles.
Cooch Behar division	765
Assam division	4,565*
Dacca division	4,000(?)
Chittagong division	5,670
Total	15,000

*This area does not include the forests in the Khasi and Jynteah Hills.

FOREST DEPARTMENT, BENGAL.

Area of Plantations for the year 1872-73.

Name of Plantation.	Area in 1871-72.	Total cost.	Area added during 1872-73.	Amount expended during 1872-73.	Total area up to 1872-73.	Total expenditure incurred up to 1872-73.	Remarks.
Cooch Behar Division.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	
Rungbool	450	9,119 10 6	.....	75 6 0	450	9,195 0 6	
Bamun Pookree	10	2,373 9 0	30	1,216 6 10	40	3,589 15 10	
Fallacutta	.....	.....	3	204 4 11	3	204 4 11	
Mohanuddy	.....	.	14	45 8 0	14	45 8 0	
Gulrua	.....	.....	14	103 8 0	14	103 8 0	
Dhobee Jhara	42	31 8 0	.. .	0 8 0	42	32 0 0	
Ramshale Haut	.....	133 13 6	.....			133 13 6	
Assam Division.							
In Luckimpore Makoom	2	353 0 0	2	133 12 6	4	536 12 6	
„ Kamroop Koolsee	.....	.....	8	411 13 6	8	411 13 6	
„ Cossyah Hills Shillong tree nursery	.....	.	5	906 5 1	5	906 5 1	
Chittagong Division.							
Seetapahar	.....	231 0 0	8	179 13 9	8	410 13 9	
Kassalong	.....	.....	.	4 10 0	....	4 10 0	
Pahartullee	.....	.....	5	324 14 6	5	324 14 6	
Holingamara	.....	.....	.....	300 0 0		300 0 0	100 acres prepared only.
Total	504	12,242 9 0	89	3,956 15 1	693	16,199 8 1	

FOREST DEPARTMENT, BENGAL.

Area of Forest Tracts protected from fire up to 1872-73.

Cooch Behar Division.

		Acres.
Mooraghat ...	Additional area protected in 1872-73	420
	Total area protected up to 1872-73	420

REMARKS.—Expenditure Rs. 30-2-0 charged to A.—VIII as the line was cut by officers while surveying the tract.

FOREST DEPARTMENT, BENGAL.

Prosecutions for breaches of Forest Rules during 1872-73.

		Cooch Behar.	Dacca.	Total.
Number of prosecutions	Number of cases	5	3	8
	,, persons	7	3	10
Convictions obtained or still pending ...	Number of cases, convictions	2	...	2
	,, ,, pending	2	...	2
	Number of persons convicted	2	...	2
	,, ,, under trial	4	...	4

A. L. HOME, *Deputy Conservator,*
In charge, Office of Forest Accounts, Bengal.

APPENDIX A.

List of the principal trees growing in Assam, exclusively of the Khasi and Jynteah Hills, prepared by G. MANN, Esq., *Assistant Conservator of Forests, Assam Division.*

Current number.	Systematic name.	Native name.	Size of tree when full grown in feet.	Remarks.
			Feet.	
1	Shorea robusta	Sâl	6-15	Growing collectively, forming forests of its own. Seasoned timber does not float. Quality of timber superior, used for canoes and in building.
2	Dalbergia sissoo ...	Sissoo	6-12	Growing collectively chiefly on newly formed land on river banks. Seasoned timber does not float. Quality of timber superior, used for furniture and in building.
3	Artocarpus chaplasha ...	Sam	6-15	Growing in mixed plain forests and mixed lower hill forests. Quality of timber superior, chiefly used for canoes, floats, also for furniture and in building.
4	Artocarpus integrifolia ..	Kuthal	6-8	Tree not indigenous, but found in many of the mixed plain forests, where they were probably planted at first by villagers before the Burmese invasion; timber superior, furniture, posts, and buildings; timber floats.
5	Cedrela toona	Hendury Poma ...	6-15	Grows scattered in mixed plain and lower hill forests; timber floats, superior, used for furniture, canoes, and building. Flowers in March, seed ripens in June and July.
6	Michelia champaca ...	Tita sappa... ...	6-10	Grows scattered in mixed plain and lower hill forests; floats, used for canoes, furniture, building; is superior.
7	Lagerstrœmia reginæ ..	Ajhar	6-10	Growing chiefly at the margin of mixed plain forests; timber superior, canoes and building; floats.
8	Mesua ferrea	Nahor	5-6	Growing in mixed plain and lower hill forests; timber good, chiefly used for house posts; does not float. Flowers in April, seed ripens in August.
9	Camphora glandulifera ...	Gunserai	6-10	Growing in mixed plain and lower hill forests, chiefly used for canoes and building; timber very durable; floats.
10	Engenia mangifolia ...	Bun-jamoo ...	6-10	Grows very scattered in mixed plain forests; used for building; timber superior, but rare.
11	Engenia jambolana ..	Bur-jamoo ...	6-10	Ditto ditto
12	Bishofia Javanica... ...	Uriam ...	6-10	Growing in mixed plain forests, chiefly in the neighbourhood of rivers; timber good and very useful for post for bridges; floats.
13	Gmelina arborea	Gomaree	6-8	Growing chiefly in desideous forests; timber good, used for canoes, planks, drums, and building generally; floats.
14	Marlea sp.	Bola	6-0	Growing very scattered in mixed plain forests; timber floats and is superior; chiefly used for boat, oars, and furniture.
15	Albizzia odoratissima ...	Koroi ...	6-8	Growing very scattered chiefly in desideous and savannah forests; timber floats; of good quality for building.
16	Cassia fistula ...	Sonaroo ...	4-6	Growing in mixed plain forests and lower hill forests; timber very durable; chiefly used for house posts; does not float.

APPENDIX A.—(*Continued.*)

Current number	Systematic name.	Native name	Size of tree when full grown in feet.	Remarks
			Feet.	
17	Acacia catechu	Khair	4-5	Growing collectively, chiefly on newly formed land on river banks ; seasoned timber does not float ; chiefly used for house-posts and charcoal burning ; timber good.
18	Shorea sp. . . .	Makai ...	6-10	Growing in lower hill forests ; timber floats ; is of middling quality ; chiefly used for canoes and planks.
19	Michelia oblonga	Phool sappa ...	6-10	Growing in mixed plain and lower hill forests ; timber floats ; is middling ; used for canoes, rough furniture
20	Echinocarpus titiaceus ...	Phool hingoree ...	6-8	Growing in mixed plain forests and lower hill forests ; timber floats, and is middling ; used for planks and beams, where not exposed to changes of weather.
21	Castanopsis tribuloides .	Bur-hingoree ...	6-8	Growing in mixed plain forests and lower hill forests ; timber floats, and is middling , used for planks and beams, where not exposed to changes of weather.
22	Terminalia citrina ...	Hilika	6-8	Growing in mixed plain forests and lower hill forests, scattered ; timber floats ; is of middling quality ; used for planks and ordinary building purposes.
23	Terminalia tomentosa ...	Amaree	6-10	Growing in mixed plain and lower hill forests ; timber floats ; chiefly used for canoes and ordinary building purposes ; timber of middling quality.
24	Phima (Gordonia) mollis	Makreeah ...	6-12	Growing in sâl and other desideous forests, also in lower hill forests ; used for canoes, planks, and ordinary building purposes ; is of middling quality ; floats.
25	Garuga pinnata ...	Gendelly poma	6-12	Growing in mixed plain and lower hill forests ; used for canoes, planks and ordinary building purposes ; timber middling ; floats
26	Bignonia chelonoides	Parellee . . .	6-8	Growing in mixed plain and lower hill forests , floats ; used chiefly for planks and ordinary building purposes ; is of middling quality.
27	Nauclea cadamba	Roghoo	6-8	Growing chiefly at the margin of mixed plain and lower hill forests ; chiefly used for planks, for tea-boxes, and ordinary building purposes ; is of middling quality, and floats
28	Nauclea cordifolia		6-8	
29	Vitex pubescens	Gohorah . .	4-6	Growing in Upper Assam in the mixed plain forests ; timber of good quality but short , chiefly used for house-posts ; floats.
30	Terminalia bicolorata	Hulluch ..	6-10	Growing in mixed plain forests, chiefly on river banks ; timber floats, and is of middling quality ; used for canoes and ordinary building purposes.
31	Ehretia serrata ..	Booal	4 6	Growing scattered in the mixed plain forests ; timber of middling quality ; floats ; used for oars, planks, and ordinary building purposes.
32	Garcinia pedunculata	Borthekra	6	Growing in the mixed plain forests ; floats , is of middling quality ; used only for planks, beams, and ordinary building purposes
33	Mangifera sylvatica	Bun am	6-12	Growing in mixed plain and lower hill forests, used for rough furniture, planks, and ordinary domestic purposes ; quality middling ; floats.

APPENDIX A.—(*Continued.*)

Current number.	Systematic name.	Native name.	Size of tree when full grown in feet.	Remarks.
			Feet.	
34	Mangifera Indica... ...	Ghoree-am ...	6-10	Tree is met in many of the mixed plain forests, where it has in all probability been planted before the Burmese invasion; timber like the above.
35	Bombax Malabaricum ...	Simool	6-15	Growing chiefly on the chur lands and the margins of the mixed plain forests; wood inferior, but largely used for tea-boxes; floats; also used for canoes.
36	Duabunga sonneratoides ...	Kochan	6-10	Growing at the margin of lower hill forests; timber inferior; floats; sometimes used for canoes, otherwise only for ordinary domestic purposes.
37	Depterocarpus Bondii ...	Hollong	6-15	Growing in lower hill forests; timber inferior, soft; floats; very rarely used for canoes; does for planks and ordinary domestic purposes.
38	Altingia excelsa	Jooteolee	6-10	Growing collectively on the margin of, or adjoining mixed plain forests; wood inferior, but used for ordinary building and domestic purposes.
39	Alstonia sp.	Sooteanah ...	6-8	Growing in the mixed plain forests; wood inferior, but much used for tea-boxes; floats.
40	Chickrassia tabularis ...	Boga-poma ...	6-8	The same as the above.
41	Emblica officinalis ...	Amlookee	3	Growing in desideous plain and lower mixed forests; wood inferior; used sometimes for house-posts; floats.
42	Lagerstrœmia parviflora...	Sidah	4-5	Growing in desideous plains and lower hill forests; chiefly used for firewood; floats.
43	Dillenia speciosa	Otengah	4-6	Growing in the mixed plain forests; fruit eaten; wood inferior, only used for firewood and burning of charcoal.
44	Dillenia pilosa	?	4	Growing in the mixed plain forests; wood inferior; used for firewood only; floats.
45	Dillenia Indica	?	4-6	Ditto ditto
46	Dillenia pentagyna ...	?	4-6	Ditto ditto
47	Salia tetrasperma... ...	Bhet	3-4	Growing near beels and on low land; wood inferior, but sometimes used for posts and planks; floats.
48	Toricellia tiliacfolia ...	Belloo	6-20	Growing in the mixed lower hill forests, and attains a great size; wood inferior, not much used, except for firewood.
49	Vitex altissima	Ahay	3-4	Growing in the mixed plain forests; wood good, but small; used for posts and planks occasionally; floats.
50	Vitex pedunéularis ...	Osai	3-4	Growing in the lower hill forests; wood inferior; floats.
51	Bursera serrata	Meertenga ...	4-5	Growing in the mixed plain forests; wood inferior, but sometimes used for planks or posts; floats.
52	Amoora rohituka	Amora	3	Growing in the mixed forests of the plain and lower hills; wood inferior but sometimes used for ordinary domestic purposes; floats.
53	Michelia sp.	Gowree champa ...	4-6	Growing in the mixed lower hill forests; wood inferior, but sometimes used for ordinary domestic purposes; floats.

APPENDIX A.—(*Continued.*)

Current number.	Systematic name.	Native name.	Size of tree when full grown in feet.	Remarks.
			Feet.	
54	Magnolia sphenocarpa ..	Burramtooree ..	3-4	Growing in the mixed plain and lower hill forests ; wood middling, but small ; sometimes used for posts ; floats
55	Talauma Rabaniana (?) ..	Sappa	3-5	Growing in the mixed plain forests and lower hill forests ; wood inferior, but sometimes used for planks and rough furniture.
56	Briedelia sp.		3-4	Growing in the mixed plain and lower hill forests ; wood inferior.
57	Carallia integerima ...	Koojee tekrah ...	3-4	Ditto ditto; fruits eaten by the natives.
58	Holigarna racemosa	Amdalee	4-6	Growing in the mixed plain forests ; wood inferior, but occasionally used for canoes, planks ; floats.
59	Engelhardtia Roxburghii	Roonigass	3-5	Growing in the lower hill forests ; wood inferior, but used for ordinary domestic purposes.
60	Quercus spicata	Sakoo hingoree	3-4	Growing sparingly in the mixed lower hill forests , wood rough and small; used sometimes for house-posts.
61	Celtis tetrauthera ...	Hooktapottia ...	3-4	Growing in the mixed plain and lower hill forests ; wood inferior, but sometimes used for canoes and planks.
62	Bauhinia Malabarica .	Kattra	3-4	Growing in the plains and lower hill forests ; wood inferior ; occasionally used for house-posts, but chiefly for firewood.
63	Bauhinia tomentosa ..			
64	Holarrhena antidysenterica	Doodcory	3-4	Growing in the plains and lower hill forests ; wood hard, but otherwise inferior ; used sometimes for post and other domestic purposes ; floats
65	Aesculus pundnana ...	Ekoohea	3-4	Growing in mixed plain forests, chiefly in the neighbourhood of rivers ; wood inferior, seldom used ; floats.
66	Barringtonia racemosa ..	Kumringah ...	4-5	Growing in the mixed plain forests ; wood inferior ; used for ordinary domestic purposes ; floats.
67	Actinodaphne obovata ...	Cherritenga ..	3-4	Growing in the mixed plain forests ; wood inferior, seldom used ; floats.
68	Actinodaphne augustifolia	Sanikoh	4-5	Growing in the mixed plain forests ; wood inferior, seldom used ; floats.
69	Rottlera tinctoria ..	Gungai	4-5	Ditto ditto.
70	Grewia elastica	?	3-4	Growing in mixed plain forests ; wood small but durable ; used for posts and planks and other domestic purposes ; floats.
71	Careya arborea	Kumbi	2-3	Growing in deciduous plain forests and sál forests , wood useless, rarely cut ; floats
72	Semecarpus anacardium..	Bhela ...	2-3	Growing in the mixed plain forests ; wood next to useless ; floats.
73	Mimusops elengi ...	?	2-3	Growing in the mixed plain and lower hill forests ; wood not used, except for firewood
74	Flacourtia cataphrasta	?	2-3	Growing in the mixed plain and lower hill forests ; wood not used ; fruit eaten.

APPENDIX A.—(*Concluded.*)

Current number.	Systematic name.	Native name.	Size of tree when full grown in feet.	Remarks.
			Feet.	
75	Castanopsis argentia ...	Hingori	3-4	Growing in the lower hill forests; wood sometimes used for ordinary domestic purposes; floats.
76	Odina wodier ...	?	4-6	Growing in the lower hill forests, is scarce; wood of good quality; used for posts and other domestic purposes.
77	Garcinia lanceæfolia ...	?	2-3	Growing in the lower hill forests; wood not used.
78	Terminalia bellerica ...	Hulluck	4-6	Growing in the mixed plain forests, chiefly on river banks; wood used for ordinary domestic purposes.
79	Tetranthera laurifolia ...	?	3-4	Growing in the mixed plain forests; wood not used.
80	Callicarpa arborea ...	?	2-3	Growing in the lower hill forests; wood not used.
81	Ficus elastica ...	Attah-bur ...	30-40	Caoutchouc trees.
82	Ficus laccifera ...	Bur	20-30	
83	Ficus Rumphii (cordifolia)	Pakri	10-20	The lac insect is reared on these.
84	Ficus camosa ...	Jooree pakri ..	10-20	
85	Ficus nitida ...	?	10-20	Useful for charcoal for tea manufacture.
86	Ficus infectoria ...	?	10-20	
87	Ficus genisulata ...	?	6-10	Ditto ditto.
88	Ficus radicans ...	?	6-10	
89	Ficus hispida ...	?	5-6	
90	Ficus sp. ...	?	6-10	
91	Sterculia villosa ...	Oodal	4-6	The bark is used for rope manufacture.
92	Artocarpus lacoocha ...	Dowa	6-10	The bark is chewed by the natives.
93	Excoecaria baccata ..	Adamsali... ...	4-6	
94	Machilus sp. ...	Moezankori ...	2-3	Silkworm plants.
95	Machilus odoratissima ...	Soom	4-6	
96	Tetranthera monopetala .	Sooaloo	3-4	Ditto ditto.
97	Cylicodaphne nitida ...	Kotoloah	3-4	
98	Symplocus grandiflora ...	Boomrotee ...	3-4	
99	Cinnamonum obtusifolium	Patee chunda ...	4-6	
100	Phoebe glaucescens ..	?	2-3	
101	Tetranthera glauca ..	?	2-3	
102	Morus Indica	Noanee	1-2	

Remark.—This list does not include the trees met with in the Khasi and Jynteah Hills.

G. MANN,

Assistant Conservator of Forests, Assam Division.

APPENDIX B.

List of trees in the Palamow District, Chota Nagpore Division, observed by Dr. W. Schlich, *Conservator of Forests, Bengal, while on a rapid tour through Palamow*, 1873.

No.	Name of family.	Systematic name of tree.	Local name of tree.	Remarks.
1	Anonaciæ	Saccopetalum tomentosum ...	Kirna	Large tree; wood said to be soft and useless.
2	Capparideæ	Crataeva religiosa	Barun	Tree of moderate size; planted only.
3	Bixineæ	Cochlospermum gossypium ...	Galgal	Tree of moderate size; wood soft and useless.
4	Malvaceæ ...	Bombax Malabaricum ...	Simur	Cotton tree.
5	Dipterocarpeæ ...	Shorea robusta	Sakwa [sal] ...	Used as timber, for charcoal and firewood; yields a resin called "dhuna."
6	Rhamnaceæ	Zizyphus rugosa	Bithor	A small tree apparently; fruit said to be eaten by the poor only in years of scarcity.
7	Ditto	Zizyphus jujuba	Ber	Only seen as a shrub; fruit edible.
8	Ditto	Zizyphus scylopyra	Kakor	A small tree apparently.
9	Sapindaceæ	Schleichera trijuga	Kusum	Large tree; wood highly prized; exported to Gya, Patna, and Shahabad districts for rice-pounders, oil-presses, sugarcane-crushers, &c.
10	Meliaceæ	Melia azadirachta	Nim	Planted only.
11	Ditto	Melia azedarach	Agas	Ditto
12	Ditto	Cedrela toona	Tuni	Probably only planted.
13	Ditto	Soymida febrifuga	Garohan ...	Tree; wood used, but not extensively; bark febrifugal.
14	Aurantiaceæ ...	Aegle marmelos	Bel	Wood-apple tree; wood much prized and used.
15	Therebinthaceæ ...	Boswellia thurifera	Salai	Tree; wood very soft and light; it is used in floating heavy timber; yields a gum.
16	Ditto	Semecarpus anacardium ...	Belawa	Marking nut tree; moderate size; wood said to be useless.
17	Ditto	Odina wodier	Ginyan... ...	Tree; wood prized and used.
18	Ditto	Mangifera Indica	Am	Planted only.
19	Ditto	Buchanania latifolia	Piar	Tree of moderate size; wood used for domestic purposes; fruit used by confectioners.
20	Leguminosæ ...	Albizzia, (lebbek, *or* procera)	Garso	Large tree.
21	Ditto	Acacia catechu	Khair	Tree of moderate size; wood used for the manufacture of cutch.
22	Ditto	Acacia ferruginea	Khaur	Tree of moderate size; wood said to be good.
23	Ditto	Bauhinia retusa	Tewar	} Trees of moderate size.
24	Ditto	Bauhinia variegata	Kusanar ...	
25	Ditto	Bauhinia tomentosa	Kadmahuli ...	
26	Ditto	Bauhinia sp.	Gadmar ...	
27	Ditto	Cassia fistula	Persar	Tree; wood prized and used.
28	Ditto	Tamarindus Indica	Imli	Preserved for the fruit's sake; timber much prized.
29	Ditto	Pongamia glabra	Karanji	Tree; wood said to be good, but not extensively used; fruit yields an oil.
30	Ditto	Butea frondosa	Paras	The lac tree.
31	Ditto	Butea sp.	Sanar	
32	Myrtaceæ	Engenia jambolana ...	Jamun	Tree; wood not much used.
33	Ditto	Engenia caryophyllifolia ...	Jamti	Large tree; wood prized and used.
34	Ditto	Careya arborea	Kumbi	Tree; wood little used.
35	Lythrarieæ	Lagerstrœmia parviflora ..	Sida	Tree; wood much prized, and extensively used.
36	Combretaceæ ...	Terminalia tomentosa ...	Asau	Large tree; wood hard, highly prized, and extensively used. Tusser silk tree.
37	Ditto	Terminalia glabra	Kahua	A very large tree; wood hard and very much prized; extensively used.
38	Ditto	Terminalia bellerica	Bahora	Tree; wood light; said to be good, and used in cart-making.
39	Ditto	Anogeissus latifolia ...	Thanta	Large tree; wood highly prized; hard and durable; extensively used.
40	Samydaceæ	Cascaria tomentosa	Beri	Small tree; wood not used.
41	Cornaceæ	Alangium decapetalum ...	Thaila	Small tree; wood not used.
42	Rubiaceæ	Ixora parviflora .. .	Kota	Small tree; wood hard and good.
43	Ditto	Hymenodictyon thyrsiflorum	Purgur	Tree; wood said to be soft, not used.
44	Ditto	Nauclea cordifolia	Karam	Large tree; wood light, but much prized and extensively used.
45	Ditto	Gordonia latifolia	Panpar .. .	Tree; wood used, but not extensively.
46	Ebenaceæ	Deospyras tomentosa	Kien	Large tree; ebony; wood hard and black, and much prized
47	Sapotaceæ	Bassia latifolia	Mahua	This tree is preserved on account of its flowers, from which arrack is distilled, and which are eaten; wood used for domestic purposes.
48	Boragineæ	Ehretia lævis	Panapoti ...	Tree of moderate size; wood not used.
49	Verbenaceæ	Tectona grandis	Sagun	Only a small number of young trees planted at Daltongunge.
50	Ditto	Gmelina arborea	Gumhar ...	Large tree; wood light; extensively used.
51	Ulmaceæ	Ulmus integrifolia	Chilbil	Very large tree; wood prized and used.
52	Euphorbiaceæ ...	Emblica officinalis	Aula	A small tree, or of middling size; wood not used.
53	Urticaceæ	Ficus Bengalensis	Bar	
54	Ditto	Ficus religiosa	Pipur	
55	Ditto	Ficus Rumphii (cordifolia) ...	Pakkar ...	
56	Ditto	Ficus lencocarpa	Guler Dumar .	
57	Ditto	Ficus parasitica	Keksi	
58	Ditto	Ficus tomentosa	Barunkaya ...	
59	Ditto	Artocarpus integrifolia ...	Kadahar ...	Jack-fruit tree; planted only.
60	.....	... ...	Guritch ...	Wood prized and used.
61	.....	... ...	Karhar.	Tree with thorny stem, and fruit of the shape of a large apple; wood not used.

APPENDIX B.—*(Continued.)*

No.	Name of family.	Systematic name of tree.	Local name of tree.	Remarks.
62	... .	... ...	Tiloi	Wood said to be good.
63	.....	... ...	Kagahi	Small tree with soft wood.
64	.....	... ...	Kiaunji... ...	Wood said to be good, but this is doubtful; yields a gum.
65	.....	... ...	Dawar	Wood said to be useless.
66	.....	... ...	Thon	Wood much prized and extensively used.
67	.....	... ...	Gari	Wood soft; not used.
68	.....	... ...	Sauraj	Nothing known about these trees.
69	.....	... ...	Karaunda ...	
70	.....	... ...	Jumar	
71	Gramineæ	Bambusa stricta	Bans	This bamboo does not attain a large size in Palamow. It is extensively used, and large quantities are exported to Gya, Shahabad, and Patna districts.

CALCUTTA,
The 18th April 1873.

W. SCHLICH,
Conservator of Forests, Bengal.

APPENDIX C.

List of trees and shrubs met with in the Sunderbuns.

Current number.	Systematic name.	Native name.	Lengths in which generally cut.	Uses.
1	Heritiera littoralis ..	Soondree ...	8′ to 16′, occasionally 35′.	Beams, buggy shafts, planks [flooring and boat building], paddles, posts and furniture. Occasionally for masts and rudders. Hard, durable wood.
2	Excœcaria Agallocha	Gengwa ...	10′ to 15′ ...	Posts for native houses, native drums, toys, &c. Soft light wood, firewood.
3	Avicennia tomentosa	Bani ..	8′ to 16′ ...	Sluices, &c., a hard brittle wood, firewood.
4	Sonneratia apetala	Keowra ..	6′ to 10′ occasionally to 20′.	Planks for in-door use, decays quickly when exposed. Wood soft.
5	Aegiceras corniculata	Kolsha ...	5′ to 8′ ..	Used for firewood and occasionally in native hut building.
6	Carapa obovata	Poshoor .	12′ to 24′ ...	Posts for building purposes, small girth. Hard wood, occasionally small planks.
7	Cynometra bijuga .	Shingr ...	3′ to 5′ ...	Firewood. A hard crooked growing timber.
8	Rhizophora mucronata.	Bhara ..	6′ to 8′ ...	Occasionally used in native hut building. Firewood.
9	Lumnitzera racemosa	Kripa ..	8′ to 15′ ...	Occasionally used in native hut building. Firewood
10	Amoora cucullata ...	Amoor ..	10′ to 15′ ...	Posts for native huts. A hard wood, firewood.
11	Bruguiera gymnorhiza.	Kakra .	6′ to 12′ ...	„ „ „ native furniture, &c.
12	Thespesia populnea...	Parash ...	8′ to 16′ ...	In native hut building, occasionally planks for in-door use.
13	Dalbergia monosperma.	Pancheoli	4′ to 6′ ...	Firewood.
14	Afzelia bijuga ...	Shoondal	8′ to 12′, occasionally to 18′.	Planks for in-door use; decays quickly. Firewood.
15	Pongamia glabra ...	Dalkaramcha ...	6′ to 12′ ...	Firewood. Produces an oil used for medicine and also for burning.
16	Hibiscus tiliaceus ...	Bola ...	4′ to 8′ ...	Firewood. Soft, inner bark used by wood cutters for dragging timber and fixing firewood on boats, when twisted into rough ropes.
17	Salacia prinoides ...	Dimal ...	4′ to 6′ ...	Small straggling wood. Firewood, occasionally inner wood used for making beads for charms.
18	Acanthus ilicifolius,	Kentki ..	2′ to 4′ ...	Firewood only.
19	Cerbera Odallam ...	Daboor	2′ to 4′ ..	Ditto.
20	Tamarix Gallicavar: Indica	Jhaoo .	2′ to 4′ .	Ditto.
21	Clerodendron inerme	Bhoonjam ..	2′ to 4′ ..	Ditto. Leaves used medicinally by natives.
22	Ceriops Roxburghiana.	Goran ...	0′ to 12′ ...	Extensively used in Calcutta for firewood.
23	Phœnix paludosa ..	Golpatta ...	.....	Leaves used extensively in Calcutta for thatching.

A. L. HOME,

Calcutta, 15th May 1873. *Deputy Conservator of Forests, Bengal.*

APPENDIX D.

General description of the Mahanuddy Terai Forest Range. By J. SYKES GAMBLE, ESQ., B.A., *Assistant Conservator of Forests, Sikkim Sub-Division.*

1. *Area.*—The area of the Mahanuddy Terai range is as follows:—

Number.	Name of forest.	Sal forest.	Khair and Sissu forest.	Mixed plain forest.	Savannah forest.
		Acres.			
1	The Teesta Savannah forest	.....	.....	.....	505
2	„ Teesta Sivoke Sissu forest	.....	322	.....	.....
3	„ Shummur Danga Sal forest	522	.....	... ..	.... .
4	„ Singaru Pahar forest	.....	.....	270	. . .
5	„ Sivoke Sal forest	1,554	.....	.....	..
6	„ Shilibhita Savannah forest	.....	.....		245
7	„ Goolma-Goroomara Sal forest	125	.....	.....	.....
8	„ Goolma-Choklong Savannah forest	.....	.....	.....	420
9	„ Champasaree Jhar Sal forest	1,671	.....	.....	....
10	„ Champasaree Savannah forest	.....	.....	. . ..	463
11	„ Mahanuddy Khair forest	.....	573	.....	.. ...
12	„ Moorgong Savannah forest	.....	. ....	.....	901
13	„ Moorgong Sal forest	763	.....	.....	.... .
	Total	4,705	895	270	2,534
	Grand Total	8,404 acres.			

2. *Boundaries and the properties with which they march.*—The range is bounded on the north by the Darjeeling hill territory; on the west by the Ganges-Darjeeling cart road; on the east by the Teesta river; and on the south by tea estates, other cultivated land, and the Bykuntpore sal forest, the property of the Rajah of Julpigoree.

3. *Topographical description.*—The ground is tolerably level, having a slight slope towards the south, and rising in places to elevated (30—400 feet) plateaux, through which the rivers probably have out their way, and left the steep ridges, which run almost parallel to their banks.

The chief rivers traversing the tract are the following:— 1*st*, the Teesta, on the east boundary, always running, and navigable to Sivoke for very light boats the whole year round. In April it rises very quickly owing to the melting of the snow on the mountains of Sikkim and Thibet, and during the rainy season a very large volume of water is brought down; it is then well adapted for floating timber. 2*nd*, the Sivoke river, which joins the Teesta at Sivoke, runs the whole year round, but during the rainy season only has sufficient water for floating 3*rd*, the Gulma river, which receives two principal tributaries—the Goroomara and Choklong rivers—is dry for a great part of the year. 4*th*, the Mahanuddy river, a large river, crossing the tract from north to south. In the dry and hot seasons the water disappears soon after leaving the hills, and re-appears after leaving the boundary of the tract about five miles down. Floating can only be carried on in the rains. 5*th*, the Punchevnaie river, which shows the same peculiarities as the Mahanuddy.

The chief roads are the following:—1*st*, road from Sivoke to Silligoree, 12 miles. 2*nd*, road from Sivoke to Mahanuddy and on to Sookeea, about 15 miles; this is commonly called the "timber road." 3*rd*, road from Choklong to Champasaree, another timber road. 4*th*, the road from Mahanuddy to Silligoree joining the cart road near the bridge over the Punchevnaie river, about 10 miles. 5*th*, the Ganges-Darjeeling cart road on the west boundary.

4. *Soil (geological description)—climate.*—The soil is almost invariably sandy, mixed in some places with clay, and everywhere with a large amount of "humus." It is evidently chiefly formed by the decomposition of the gneiss and mica schist rocks of the Darjeeling hills. The climate is very damp during the greater part of the year, the rains beginning gradually from the end of March, falling at intervals during the hot weather, and regularly setting in by the beginning of June.

5 *Description of the forest as to species, age, and condition.*—No 1.—*The Teesta Savannah forest* consists of a low-lying tract of marshy land, covered for the most part with long grass and with common trees, and with a dense growth of swampy plants, such as wild plantains, gingers, &c., towards the Jhenaikhoorie Nuddy. It is bounded on the east by the Teesta river, and on the west by the Jhenaikhoorie Nuddy, which separates it from the Shummur Danga sâl forest and the Bykuntpore private forest. Very few trees of any value are to be found, with the exception of a few sissu and siriss towards the Teesta, and perhaps a few sal or saj trees on the north-west boundary.

No. 2.—*The Teesta and Sivoke sissu forest* occupies the low ground on the banks of the Sivoke and Teesta rivers. It is intersected by numerous channels, which are liable to change every year. It is of irregular shape, being bounded on the north by the Sivoke river, on the east by the Teesta river, and on the south-west by the Singaree Pahar mixed forest and the Shummur Danga sal forest. The soil is chiefly gravel and sand, evidently the deposits of the rivers which inundate it more or less every year. The sissu for the most part is young, and these young forests are very good about Sivoke, on Sivoke Island, and the banks of the Teesta. The few large trees are chiefly on the banks of the Sivoke Jhora in the drier situations. Khair is not very abundant, it being chiefly found in one or two patches on the banks of the Teesta. The other most prominent trees are siriss and semul, the first being good and of large size about Sivoke. Where the sissu is thickly grown, there is not much long grass or even small shrub for undergrowth; but in the less dense parts there is an enormous quantity of very tall grass and a thick growth of wild plantains, gingers, and a species of "desmodium." There is not much sale of timber, the chief sales being for cart wheels and axles for the carts on the road at Silligoree. Timber could be easily exported by river from this forest down to Julpigoree; and if the sissu be allowed to grow, it is possible that in some years' time it may be made very profitable.

No. 3.—*The Shummur Danga sal forest* consists of a square tract containing belts of sal, saj, and grass jungle. It is bounded on the north by the Teesta and Sivoke sissu forest; on the east by the same, and the Teesta savannah forest; on the west by the Singaree Pahar mixed plain forest; and on the south by Bykuntpore forest. Towards the Teesta the ground is low, but it gradually rises to the west In the southern part is the site of an old Mechia village. Such sites are always easily recognized, from the trees having been cut over about three feet from the ground and sending up a number of shoots from thence. The sal in places is very good, some of large size; but the creepers seem never to have been cut, and spoil the trees very much indeed. There is a belt of very fine old saj trees, also much troubled with creepers; but of very good growth, and almost, if not quite, mature. Of other trees, jamun grows to a large size and very straight, as also do seada and oodal; the latter particularly useful for the good ropes that are made of its bark, and for the copious gum, which exudes on its being cut. In the strips of grass jungles which alternate with those of sal and saj, the chief and almost only tree is palass. It is not however used in this country either for timber or for the collection of lac. The timber from this forest can easily be worked out either by the road which leads from Shummur Danga village to Silligoree, or, which is better, by floating down the Teesta river. This is, as far as I know, almost the only tract in the Terai which escaped fire, at any rate till long after March; this may be ascribed to its being very much out of the way of cattle grazers.

No 4.—*Singarèe Pahar mixed plain forest* is a long strip of forest bounded on the south and west by the steep ridge which forms the boundary of the Sivoke sal forest. It lies on this slope, and in the dense swampy cane-brake at its foot. It is exceedingly damp and marshy at all seasons, and is so filled with a dense growth of canes, creepers of all sorts, and epiphytic plants, such as orchids and ferns, that it is very difficult to penetrate. Both on the side of the Sivoke and Teesta rivers it is traversed by a small river towards the Teesta—the Remahee Jhora. Among the trees which are found in it, the principal is toon, which grows well, though not in very great numbers, on the Sivoke slopes of the Singaree Pahar. There, too, the true India-rubber (*Ficus elastica*) is found; and the *Ficus obtusifolia*, an indifferent species, is common towards the Teesta. In some parts, especially to the south, katoos is common, and sal and saj are not uncommon on the slopes. This forest might be rendered very useful in future for the planting of both toon and India-rubber, and for the extraction of canes The timber of the first, or the rubber from the second could easily be brought out by the road to Silligoree.

No. 5.—*Sivoke sâl Forest.*—This forest, by far the most important one in the tract, occupies a plateau in the angle formed by the ridges parallel to the Teesta and Sivoke rivers, elevated about 100 to 400 feet (on the boundary line the height measured was 345 feet). It is bounded on the north and east by this ridge; on the west by the Goroomara hills and river, a ridge, and the Jeeal Jhora; and on the south by the Bykuntpore forest. The

land is nearly level throughout the forest: it is crossed in a few places by small streams, such as the Singhee Nuddy and Jeeal Jhora; but these are dry except in the rains. The soil is dark sandy, with a small admixture of clay in parts; the subsoil is almost pure sand, as is easily seen by the many sections obtainable on the slope of the Singaree Pahar ridge. On the southern boundary there is very much long grass with few trees, and these bearing unmistakable evidences of the annual recurrence of the jungle fires. An attempt was made this year to keep them out, but without success. In this part are many old sal trees of large size, but perfectly rotten inside, which accounts for their not having been cut by Mr. Dear, who some years ago was given the right of bringing out sal from the Government forest, and who cut every tree of marketable value. The rest of the forest, however, with the exception of a small portion at the foot of the Goroomara hills, also covered with long grass, is very good, the cover thick, the tall grass in very small quantity, and the growth of the trees admirable. The undergrowth consists chiefly of creepers, seedlings of forest trees, and quantities of the *leea robusta*, a soft-stemmed plant with large leaves, which, however, dies down at the end of the rains. The creepers in some parts, especially the borla or *Bauhinia Vahlii*, and debrelara (*Ertada sp.* or *Butea sp.*), do a great deal of damage, and should be cut: of other trees a few good chalownee are occasionally to be found; also jamun, seeda, oodal, and gambari, all of them useful trees, though little used in this country. Timber can be taken out of this forest either by the cart road to Silligoree, or by dragging to the Teesta river and thence floating to Julpigoree. Along the road from Sivoke to Silligoree are 100 trees marked with tin tickets; these have been measured this year, and these measurements, in comparison with those to be taken in the future, will give data for determining the rate of growth. They are of all sizes, from the sapling 10 feet high to the 4 or 5-cubit girth tree.

No. 6.—*Shilibhita savannah forest*, a tract of long grass, bounded on the north by the Goroomara hills, on the east by the Sivoke sal forest, on the south by the Jeeal Jhora, and on the west by the Goroomara river. It is crossed by the road from Sivoke to Sookna, and a path leading to Goroomara village. In it is a piece of land called Shilibita jote, containing 27 acres, belonging to a native who for some years cultivated rice upon it. The boundaries of this jote are not easily determined; they have been laid down on the map from their position in the revenue survey maps. In the angle formed by the Jeeal Jhora and the Goroomara river is a small piece of land which was planted with India-rubber cuttings; these have, however, all failed. The trees are very few, and consist merely of a few sal saplings of pretty good growth scattered over the forest in the long grass, chiefly towards the north.

No. 7.—*The Goolma Goroomara sal forest* occupies a small plateau between the Goolma and Goroomara rivers, and the low ground round it. It is bounded on the north by the lower hills, and on the south by the Bykuntpore forest. The soil is good on the plateau, but bad in the low ground, and is chiefly composed of sand much mixed with humus.

The sal on the plateau is good, resembling that in the Sivoke sal forest; but the lower parts towards the Goroomara and Goolma rivers have more the character of Savannah.

No. 8.—*The Goolma Choklong savannah forest* occupies the land between the lower hills and the Goolma river, and is bounded on the west by the Choklong river. Valuation surveys were made in it, but with such poor result that it has been set down as savannah. It is crossed by several small streams, especially by the Baboonee Jhora, the banks of which are covered with the damp-loving vegetation of the mixed forests. In this forest is the Baboonee Bhita jote, consisting of 30 acres of land with a boundary entirely undefined except on the revenue survey maps. It belongs to a man named Sinchoo of Silligoree, but is not cultivated. In some parts of this forest are small patches of good young sal, but the majority of the forest is covered by very tall grass, and a few trees of unreserved kinds, as semul and parari.

No. 9.—*Champasaree Jhar sal forest* is a large tract of forest land bounded on the north by the Choongloong and Choklong Jhoras at the foot of the lower hills; on the east by the Goolma and Choklong rivers; on the south by Mechia cultivation in Champasaree savannah forest; and on the west by the Mahanuddy river. The soil is a sandy gravel towards the north, and a sandy clay towards the south of the forest, thus the trees on the north are universally bad, while to the south the forest is very good in many places. It is traversed from north to south by the timber road from Choklong depôt to Champasaree, and thence to Silligoree. There was another timber road running from the Choongloong river to Champasaree, but it can now be traced only a short distance. In this forest is the Choudries' Bhita jote, the boundaries of which I have only been able to determine approximately even with the aid of the revenue survey map; it consists of 57 acres 2 roods of land now not under cultivation. The upper part of the forest has more the character of savannah; it is crossed by a few belts of small sal, but generally is very bad. The lower part consists, in many places, of a fine sal forest with tall well-grown trees. Here, however, the soil is much better. On the top of the steep ridge on the bank of the Mahanuddy is a thick forest of small useless trees much obstructed by creepers, and towards the edge of the Goolma river, after descending the ridge along it, a thick forest of damp-loving trees is found, and a few toon and katoos have been observed.

No. 10.—*Champasaree savannah forest.*—An irregularly shaped tract of present and old cultivation between the Champasaree Jhar sal forest and the boundary line. It is chiefly occupied by the cultivation of rice, maize, castor-oil, &c., by the squatters of Champasaree Mechia Bustee, and, as forest, is of no value whatever. The boundary line separates it from land belonging to Mr. Lloyd and Sundao Gwal.

No. 11.—*Mahanuddy Khair forest.*—This forest occupies the whole length of the right bank of the Mahanuddy river as far as Government forest extends. It is bounded on the north by Hattisurra lower hill forest, on the east by the Mahanuddy river, on the south by the Moorgong tea estate (also khair forest), and on the west by the Moorgong savannah forest. It consists of the low-lying ground on the banks of the Mahanuddy, liable every year to be flooded. This land rises gradually in terraces from east to west, and the forest consequently improves in the same direction, as it is less liable to be washed away on the higher parts than the lower. The west boundary is a small ridge, at the foot of which, in most places, runs a small stream. The forest is much intersected by branches of the Mahanuddy, one of which has water in it all the year round, while the Mahanuddy itself is dry for many months. The soil is a sandy gravel evidently deposited by the river, and is rather difficult of penetration by the roots of the trees. Khair forms the most important element among the species of tree found growing in the forest; on the upper slopes are many trees of large size (*i. e.* large size, comparatively speaking, for khair), but the size of the trees decreases as they approach the river; and on the banks of the river itself the forest is merely a dense thicket of young khair. There are a few good sissu in the upper parts, and the principal other trees are semul, hulloray, and gineri. There is very little sale of timber from this forest, though many of the khair trees are mature. Timber could easily be extracted in the rains by the Mahanuddy river, or, at any season, by the road to Silligoree. In this country the manufacture of cutch is unknown, though a large profit might be made of such forests as this, even if it were merely from the thinnings. The Mahanuddy village, or "liquor shop" as it is called on the revenue survey maps, lies in this forest, but is only inhabited during the dry and hot seasons.

No. 12.—*The Moorgong savannah forest* is a large tract of land either now or at some former period under cultivation by the Mechis. It is bounded on the north by the Hattisurra lower hill forest, on the east by the Mahanuddy khair forest, on the west by the Moorgong sal forest, and on the south by Moorgong tea estate (forest of much the same description). The soil is a good sandy clay and is said to produce good crops. In this forest lies the Moorgong Mechi village, and the cultivation of these Mechi squatters extends over nearly the whole of the forest. In timber it is useless, there being none of any size, or indeed of any value whatever. Towards the north is a small extent of land where some rubber cuttings were planted which have now failed.

No. 13.—*The Moorgong sal forest* occupies a tract of land on the Punchevnaie river. It is bounded on the north by the Sookna village cultivation and lower hill forest; on the east by the timber road and Moorgong savannah; on the south by the tea garden of the Moorgong estate and the Kynanooka jote; on the west by the Punchevnaie river and the Ganges-Darjeeling cart road. It is crossed by the Punchevnaie river and the Hattisurra Jhora, also by the timber road. The soil is very good, being the red sandy clay so much sought for by tea-planters; but is better towards the south than in the upper parts. The forest contains a few patches of very good sal, but none of any size; it is very much subject to damage by jungle fires which kill the seedlings and cause the older trees to become hide-bound. In one spot near the timber road some mahogany seedlings are said to have been planted; none are now to be found. In another, a short distance to the north of the mahogany and towards the Hattisurra Jhora, a few teak trees were put out, some are still living; but they have evidently suffered much from jungle fires. It is unfortunate that the valuation survey of this tract is not quite finished, a few more survey lines being still necessary to give the proper data. The sal appears to be tall and well grown, especially towards the Punchevnaie river. There are few other trees worthy of notice except, perhaps, a few "hurra" and "bahura,"—*terminalia chebula* and *beleric a;* but they are not of any size. On the northern boundary is the Sookna village "Fowd Sing Mundul" under the Forest Department. The squatters have no rights in the forests.

6. *Timber depôts.*—The timber depots are as follows:—1*st*, Sivoke, on the Teesta river; 2*nd*, Choklong, at the point where the Choklong river leaves the hills; 3*rd*, Mahanuddy; 4*th*, Hattisurra; 5*th*, Sookna, near the Sookna village. Timber is carried out also by road, or by the Mahanuddy river to Silligoree, and by the Teesta river to Julpigoree.

7. *Timber markets and large towns in the vicinity.*—The chief markets are Silligoree and Julpigoree. To the former the timber is carried overland or floated down the Mahanuddy; to the latter it is floated by the Teesta.

The chief villages on the borders of the forest are:—1*st*, Shummur Danga; 2*nd*, Goroomara; 3*rd*, Chumpasaree; 4*th*, Dumragong; 5*th*, Sookna Hât and Kynanooka.

8. *Lines of Export.*—These are down the Teesta to the Brahmaputra, and down the Mahanuddy towards the Ganges. The Teesta is fit for floating during a great portion of the year, but its current is very violent. The Mahanuddy is inferior for floating.

9. *List of villages remaining within the forest boundaries, limits of each, and rights on the forests possessed by the inhabitants.*—In the forest itself are these villages at the pleasure of the Forest Department, from which they hold the right of cultivating land; they have no rights on the surrounding forests:—1*st*, Champasaree, in the Champasaree savannah forest—ten cultivators paying Rs. 12 each per annum; they cultivate rice, cotton, castor-oil, maize, &c., in the waste lands in that savannah; they can only cut useless species of trees, and have no grazing rights beyond the extent of their land. 2*nd*, Moorgong, in the Moorgong savannah forest—ten cultivators paying Rs. 12 each per annum; cultivation and rights, the same as those at "Champasaree." 3*rd*, Sookna or Punchevnaie—five cultivators at Rs. 4 each per annum—on the Punchevnaie river, north of the Moorgong sal forest. They cultivate rice, maize, murwa, &c., on an extent of about 30 acres.

10. *Statement of any rights possessed by the inhabitants of the surrounding districts in respect to grazing cattle, fuel, grass, bamboos, &c.*—No such rights exist.

11. *The map of the range* on a scale of two inches to the mile is appended.

12. *Working plan.*—The materials necessary for a preliminary working plan are—1*st*, *area of the different classes of forest.*—This has been given under (1). 2*nd*, *amount of growing material.*—The results of the surveys are given in the appended Form II. 3*rd*, *rate of growth of the important trees.*—These data are not yet complete, and the drawing up of the preliminary working plan has therefore to be postponed until after next season.

J. SYKES GAMBLE, B A.,
Assistant Conservator of Forests,
Sikkim Sub-division.

PUNKABAREE,
The 1st July 1873.

No. 1.

FORM I.—*Statement showing the trees growing in the* TEESTA AND SIVOKE SISSOO FOREST *along the banks of the Rivers Teesta and Sivoke.*

NOTE.—B stands for Bengali; P for Paharia; M for Mechi; and L for Lepcha.

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Dalbergia sissoo, Roxb. ...	Sissoo, B	... ...	A few pretty large size on the Sivoke River. Elsewhere small.
2	Acacia catechu, Willd. ...	Khair, B	... ...	In patches here and there; none very large size.
3	Albizzia elata, Benth. ...	Safeid Siriss, B ...	... ...	Common everywhere; sometimes alone, or mixed only with the following. Some very large size.
4	Albizzia sp.	Bogra Siriss, P ...	... ...	Not so common as the preceding. Trees generally mutilated either for their leaves or their bark.
5	Bombax Malabaricum, D C	Semul, B	... ...	Here and there, often very large size.
6	Cedrela toona, Roxb. ...	Toon, B; Tooni, P	... ...	One or two here and there; the seeds probably brought down by floods and deposited in the rains.
7	Shorea robusta, Roxb. ...	Sâl, B	... ...	One or two here and there; seeds probably carried from the sâl forests of the plateau and Shummur Dunga.
8	Terminalia glabra, W and A	Saj, B	... ...	Very few, and those chiefly near the hills.
9	Erythrina	Furrud, B ...	... ...	Generally scattered over the forests; corky bark. Soft wood.
10	Sponia Orientalis, Voigt. ...	Koonin, B	... ...	Common on the edges towards the hills.
11	Dillenia pentagyna, Roxb....	Tatri, P; Akshi, M	... ...	Here and there, chiefly towards the edges of the forest.
12	Mallotus albus	Mallata	... ...	Common towards mixed forest.
13	Cratœva religiosa, Ham. ...	... ...	... ...	Towards the foot of the hills in shady parts.
14	Sterculia villosa, Roxb. ...	Oodal	... ...	A few to be found scattered over the forest.
15	... ...	Pooaputta, P ...	... ...	Small tree; compound leaves; rare.
16	Terminalia sp.	Pancesaj	... ...	A few small ones to be found near Sivoke River.
17	Ehretia	Boeri, P	... ...	Tree. Flowers eaten. Not common in this forest.
18	Grewia elastica, Roxb. ...	Scalposera, P ...	... ...	Not common. A few on Sivoke Island.
19	Lagerstrœmia parviflora, Roxb.	Seeda	... ...	Few, and those very small.
20	Engenia jambolana, Roxb ...	Jamun	... ...	Seedlings very common.
21	Phyllanthus emblica, I. ...	Aonla, B; Owla, M	... ...	Only one or two observed.
22	... ...	Gayo, P	... ...	Only one or two seen.
23	Mimosa rubicaulis	Aradi Kanta ...	... ...	Thorny shrub, extremely common.
24	Acacia rugata	Hurrari Kanta ...	... ...	Thorny climber, very common.
25	Capparis olacifolia, Hf. & T...	Hais, P	... ...	A few near the Sivoke Hills. Shrub.
26	Pueraria tuberosa	Berali Lara, P ...	.. ..	Blue flowered leguminous climber, very common and difficult to penetrate.

No. 2.

FORM I.—*Statement showing the trees growing in the* SHUMMUR DANGA SAL FOREST *between the Teesta River and the Singaree Pahar Ridge.*

NOTE.—B stands for Bengali; P for Paharia; M for Mechi; and L for Lepcha.

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Shorea robusta, Roxb. ...	Sal, B	... ...	The chief tree, sometimes of large size, runs in belts parallel to the Teesta and separated by savannah.
2	Terminalia glabra, W and A	Saj, B	... ...	Common everywhere. One belt almost pure, and containing many very large trees.
3	Eugenia jambolana, Roxb ...	Jamun, B	... ...	Very common, but chiefly with saj in the belt above spoken of, where found of large size.
4	Careya arborea, Roxb. ...	Koombi, B ...	... ...	Common everywhere, but chiefly with sal.
5	Eugenia	Kiamoni, P ...	... ...	Resembles koombi, but has white bark, and is smaller; opposite leaves.
6	Butea frondosa, Roxb. ...	Palass, B	... ...	Common in belts of savannah forest; always much distorted in form.
7	Bombax Malabaricum, D C...	Semul, B	... ...	Here and there a few, generally of large size.
8	... ...	Maidal, P	... .	A small tree, with fruit of the size and shape of the guava; cooked and eaten by Mechis.
9	Bauhinia variegata	Taki, P	... ...	Grows sometimes of large size.
10	Bauhinia Malabarica, Roxb.	Koirahlo, P ...	... ...	In sal and saj belts; common.
11	Callicarpa arborea, Roxb. ...	Goohlo, P	... ...	In savannah forests and in the worthless part towards the Teesta River.
12	Stereospermum suaveolens, W Ic	Parari, P	... ...	Common throughout the forest.
13	Symplocos racemosa, Roxb.	Kaiday, M; Pudlikhat, P.	... ...	Scattered here and there, especially in long grass.
14	... ...	Mahow, M; Koopeenay, P.	... ...	In bad places; common.
15	Sterculia villosa, Roxb. ...	Oodal	... ...	Not many seen; a few large ones in the saj belt.
16	Lagerstræmia parviflora, Roxb.	Seeda	... ...	Not very common; many seedlings towards East in bad part.
17	Albizzia elata, B	Safeid siriss ...	... ...	Common towards the sissoo forest on the Teesta bank.
18	... ...	Debree lara, P ...	... ...	Immense creeper; very common; should be cut from sal and saj.
19	Bauhinia Vahlii, W and A	Borla	4' 6'	Immense creeper; should be cut.
20	... ...	Natabheri, P ...	... ...	Small tree, reddish wood.

No. 3.

FORM I.—*Statement shewing the trees growing in the Singaree Pahar Mixed Plains Forest, on and below the ridge surrounding the Sivoke Sál Forest towards the Teesta and Sivoke Rivers.*

NOTE.—B stands for Bengali; P for Paharia; M for Mechi; and L for Lepcha.

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Cedrela Toona, Roxb. ...	Toon, B; Tooni, P	... ...	A few large trees to be found, chiefly on the side of the Sivoke Jhora; seedlings everywhere.
2	Castanea	Katoos, B, M, and P	... ...	Common throughout the forest, especially in the swampy parts towards Shummur Danga.
3	Ficus obtusifolia	Burr, B; Lesow, P	... ...	The small-leaved India-rubber, a bad kind, giving a waxy kind of rubber; commoner than the other kinds.
4	Ficus elastica, Roxb. ...	Lesow, P; Yok, L	... ...	The true India rubber; a few trees to be found, chiefly towards the Sivoke Jhora.
5	Shorea robusta, Roxb. ...	Sal, B	... ...	On the upper part of the Singaree Pahar slopes adjoining Sivoke sal forest, a few.
6	Terminalia gladra, W and A	Saj, B	... ...	On the slopes and in the forests at the foot of the ridge towards Shummur Danga.
7	Dillenia Indica, L	Chalta, B	... ...	Red bark; common, especially on the banks of small streams; edible fruit.
8	Sauranja	Gogen, P	... ...	Small tree; common throughout.
9	Cullenia excelsa (?) ..	Banj, P	... ...	Huge tree principally found towards Sivoke Jhora. Very much buttressed stem.
10	Mangifera sylvatica, Roxb...	Am, B	... ...	Big tree; not very common.
11	Cinnamonum albiflorum ...	Dalchini, B ...	... ...	Small-leaved species; very common; leaves used for curries.
12	Cinnamonum	Dalchini, B ...	... ...	Large-leaved species; very common; leaves not used.
13	Eugenia	... ...	... ...	Big tree; chiefly found on slopes near the Sivoke Jhora.
14	Nauclea Cadamba	Kuddum, B and P	9 feet	Big tree; not very common.
15	Pternspermum acerifolium, Willd.	Hattipaila, P ...	... ...	Big handsome tree; large leaves, whitish underneath. Said to give good timber. Common on slopes.
16	Macaranga Indica	Dugdukti, M ...	... ...	Small tree, pellate leaves, found in marshy places.
17	....	Fullidha, P ...	... ...	Tree; leaves large, whitish, not very common.
18	Alstonia Scholaris, R. Br. ...	Chatwan	4 to 6 feet	Not many large trees seen, but a good many seedlings.
19	Ficus infectoria	Pakar	... ...	On the slopes of Singaree Pahar, useless.
20	Ficus, Sp.	Borr	... ...	On the slopes of Singaree Pahar, useless.
21	Tetranthera, Sp.	Seora, P	... ...	Common in the moist evergreen forest.
22	Meliosma simplicifolia, Bl...	Kosroo, P ...	... ...	Very common, especially on the banks of small streams.
23	Eugenia, Sp.	Murmurray ...	... ...	Big tree; very common.
24	Dubanga Sonneratoides ...	Lamputtia ...	... ...	Very few seen
25	Turpinia pomifera	Putputta, P ...	... ...	Enormous leaves; few very big seen.
26	... ...	Choori, P	... ...	Large leaves; rather common on east.
27	Wendlandia coriacea ...	Tilgin, P	... ...	Small tree; common on upper slopes of the ridge.
28	Lansium, Sp.	Poonlay, P ...	... ...	Small tree; has red flower.
29	Magnoliaceæ (?)	Joben	... ...	Large leaves; not very common.
30	Calamus	Bet	... ...	Two species of cane are very common.
31	Pandanus odoratissimus ...	Keonhai, M ...	... ...	Very common, though not very large.
32	Calophyllum...	... ...	... ...	Seedlings only found.
33	Homoroya	Bajadunti, P ...	... ...	Small tree, with hard white wood; common.
34	Bauhinia anguina	Nai willi lura, P ...	... ...	Snake stem creeper; very common.
35	Bauhinia vahlii, W and A ...	Borla	... ...	Common on slopes of Singaree Pahar.
36	Murraya paniculata ...	.....	... ...	Small tree of orange family; very hard firm wood; found in a few places on Sivoke side.
37	Gordonia Wallichii... ...	Chalowuee ...	... ...	Few trees.

No. 4.

FORM I.—*Statement showing the trees growing in the* SIVOKE SAL FOREST *situated on an elevated plateau between the hills and the Byountpore Forests.*

NOTE.—B stands for Bengali; P for Paharia; M for Mechi, and L for Lepcha.

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Shorea robusta, Roxb. ...	Sal, B; Sukwa, M	8 cts.	The chief tree in the forest, in some places almost pure. Few very large ones to be found, as they have nearly all been cut formerly.
2	Terminalia glabra, W and A	Saj, B	... ...	No large trees seen, but it occurs frequently in seedlings and small trees.
3	Gordonia Wallichii	Chalownee, M and P	... ...	A few good trees in one or two places, but it is not common in the forest.
4	Dalbergia latifolia, Roxb. ...	Sitsal, B; Sitisal, P	... ...	Found towards the foot of the hills, but the trees are few and very small.
5	Cedrela Toona, Roxb. ...	Toon, B; Tooni, P	... ...	One or two seedlings occasionally found on the edges of the forest, where the seeds come from the hills or mixed forest on the Singaree Pahar ridge. Not properly a tree of the sal forest.
6	Castanea	Katoos, M and P...	... ...	Also not properly a tree of the sal forest, but found occasionally on the west edge at the Goroomara river, and perhaps in some of the small streams.
7	Careya arborea, Roxb. ...	Koombi, B ...	... ...	Very common throughout the forest, especially towards the south, where it is nearly as numerous as sal.
8	Dillenia pentagyna, Roxb. ...	Akshi, M; Tatri, B and P.	... ...	Also very common throughout the forest in all parts.
9	Lagerstræmia parviflora, Roxb.	Seeda, M and P ...	... ...	Very common on the North and East, where the long grass does not grow.
10	Eugenia Jambolana, Roxb....	Jamun, M and P...	... ...	Very common throughout the forest, sometimes of very large size.
11	Stercula villosa, Roxb. ...	Oodal, M and P ...	10′ 1″	Very common towards the ridges on the North and East, and in any spots where fires are not frequent.
12	Stereospermum suaveolens ...	Parari, M and P ...	... ...	Found generally spread over the forest, but none of very large size.
13	Gmelina arborea, Roxb. ...	Gambari, B, M, and P.	... ...	Found towards the North and West on top of the ridge.
14	Callicarpa arborea, Roxb. ...	Gochlo, P; Jamti, M	... ...	Found in bad spots on the Eastern Boundary generally, where there is little or no sal.
15	Terminalia Chebula, W and A	Hurra, P and M ...	... .	Found together in a few spots chiefly on the south and towards the Western Boundary.
16	Terminalia Belerica, Roxb...	Barha, P and M ...	... .	Ditto ditto ditto ditto.
17	Garuga pinnata, Roxb. ...	Gia, M and P ...	... ...	A few on the North.
18	Symploces racemosa, Roxb...	Kaiday, M; Pudlikat, P.	... ...	Very common on the South in ground burnt over every year.
19	Phyllanthus Emblica, L ...	Owla, B and P; Owla, M.	... ...	General over the whole forest, but very small.
20	Colosanthes Indica, Bl ...	Totilla, M; Karamkanda, P.	... ...	Very few observed.
21	Acacia ferrugenia, D C ...	Khoul, M	... ...	A few towards the North, sometimes called "khair."
22	Bauhinia Malabarica, Roxb.	Koriahlo, P ...	... ...	Towards the foot of the hills; pretty common in poor forest.
23	Bauhinia variegata... ..	Taki, P	... ...	A few observed towards the West.
24	. .. ...	Gayo, P	... ...	Rather common in bad places to West.
25	Rottlera tinctoria, Roxb. ...	Sindooria, M and P	... ...	Only one observed of any size; many seedlings towards West.
26	Michelia	Champ, P	... ...	A few seedlings only observed.
27	... ...	Gundrow, M ..	... ...	A thorny shrub; very common
28	Alstonia scholaris, R Br. ...	Chatwan, B, M, and P.	... .	Only one observed on the Eastern boundary, and a few seedlings.
29	Eugenia	Kimnoni, P ...	... ...	Resembles koombi, but white bark and opposite leaves.
30	... ...	Muhow, M; Koopeenay, P.	... .	Leaves used to feed silkworms; is the "Mooga" of Assam; common in bad places on the west.
31	Grewia elastica, Royle ...	Sealposera, P ...	... ...	Common almost everywhere, but rarely of any size.

No. 4.—(*Continued.*)

FORM I.—*Statement showing the trees growing in the* SIVOKE SAL FOREST, *situated on an elevated plateau between the hills and Bycuntpore Forests.*—(Continued.)

NOTE.—B stands for Bengali; P for Paharia; M for Mechi, and L for Lepcha.

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
32	Zizyphus rugosa	Harray Baer ...	... ...	Small tree; common in most parts.
33	Bauhinia Vahlii, W and A...	Borla	... ...	Immense climber; used for ropes; seeds edible.
34	... ...	Debre Lara ...	... ...	Immense climber; wood in concentric layers; gives a red gum. Leguminosæ Butea.
35	Holarrhena antidysenterica, Wall.	Dudhali, M ...	... ...	Common small tree; flowers in April or May.
36	Heynea trijuga	Cherenjee	... ...	Small tree, not uncommon towards Sivoke.

No. 5.

FORM I.—*Statement showing the trees growing in the Gulma-Goroomara Sal Forest, lying between those two rivers and bounded on the north by the foot of the hills.*

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Shorea robusta, Roxb. ...	Sal ...	.....	Good on the small ridge in the centre of the forest, but not many trees in the long grass towards the rivers and the hills.
2	Terminalia glabra, W. and A.	Saj ...	.....	Chiefly found isolated here and there; a few large sized trees, not many seedlings.
3	Eugenia Jambolana, Roxb. ..	Jamun ...	.....	On the central ridge; common.
4	Gordonia Wallichii	Chulownee ...	.....	Only two or three trees found.
5	Dalbergia latifolia, Roxb. ...	Sitsal ...	.....	A few seedlings found towards North.
6	Cedrela Toona, Roxb. ...	Toon ...	.....	A few seedlings found towards Gulma River.
7	Stereospermum suaveolens...	Parari ...	.....	Pretty common throughout.
8	Butea frondosa, Roxb. ...	Palass ...	.....	Common in long grass towards the rivers.
9	Careya arborea, Roxb. ...	Koombi ...	.....	Pretty common with sal.
10	Dillenia pentagyna, Roxb. ..	Tatri ...	.....	Common on the ridge with sal.
11	Lagerstroemia parviflora, Roxb	Seada ...	.....	On the ridge, not very common; one or two big trees towards North.
12	Gmelina arborea, Roxb. ...	Gambari ...	.....	Not very common.
13	Callicarpa arborea, Roxb. ...	Gochlo P. ...	.....	Found in grass jungle.
14	Bauhinia Malabarica, Roxb.	Koirahlo P. ...	.....	Ditto ditto ditto.
15	....	Latikar P. ...	.....	Ditto ditto ditto, small tree.
16	Zizyphus rugusa ...	Harray Baer P. ...	.....	Ditto ditto ditto, ditto.
17	Ehretia ...	Boeri P. ...	.....	In one or two spots near Goroomara River.
18	....	Kaindul P. ...	.....	Ditto ditto.
19	Machilus odoratissimus ...	Kowlo P ...	.....	Ditto ditto.
20	....	Kudmero P. ...	.....	Ditto ditto.
21	Ficus cunia ...	Kunhya M. Kunnai P. ...	.....	Near the Gulma and Goroomara Rivers in one or two places.
22	Melastiora Malabathricum	Choulisy P. ...	.....	Shrub, in the rivers, common.
23	....	Maidal P. ...	.....	Common in grass jungle.
24	Symploces racemosa ...	Kaiday M. Pudlikat P. ...	.....	Found in grass jungle, not very common.
25	Eugenia Sp. ...	Kimmoni P. ...	.....	A few seen in grassy places.

No. 6.

FORM I.—*Statement showing the trees growing in the Champasaree Jhar Sal Forest, between the Mahanuddy and Gulma Rivers.*

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Shorea robusta, Roxb. ...	Sal, Sukwa ...	.....	Very sparingly found over the northern portion of the forest, but better towards the South, where it is of much larger size.
2	Terminalia glabra, W. and A.	Saj ...	.....	Not very common, with the exception of a good many seedlings and stump-shoots towards the North.
3	Lagerstrœmia parviflora, Roxb.	Seeda ...	.....	Very common towards the North—but only of small size.
4	Careya arborea, Roxb. ...	Koombi ...	.....	Common, but of small size.
5	Stereospermum Suaveolens, W. Ic.	Parari ...	.....	A large tree, generally scattered over the forest.
6	Dillenia pentagyna, Roxb ...	Tatri P., Akshi M.	.....	Commonly scattered over the forest.
7	Sterculia villosa, Roxb. ...	Oodal ...	.....	Not very common.
8	Acacia ferruginea ...	Khoul ...	.....	Common in the upper and eastern parts.
9	Callicarpa arborea ...	Goohlo P., Jamti M.	.....	Common in bad parts towards west.
10	Bombax Malabaricum, D. C.	Semul ...	.....	A few large ones here and there.
11	Dalbergia latifolia, Roxb. ...	Sitsal ...	.....	Seedlings common towards North; no large trees.
12	Cedrela toona, Roxb. ..	Toon Tooni P. ...	.....	One or two on Northern boundary.
13	....	Latikar ...	.....	A small tree, very common.
14	Wendlandia cinerea, D. C....	Mimri ...	.....	Ditto ditto towards West.
15	Bauhinia variegata ...	Kachnar ...	.....	Ditto ditto towards North.
16	Terminalia Chebula, W. and A.	Hurra ...	.....	Not common.
17	....	Maidal ...	.....	Ditto.
18	Garuga pinnata ...	Gia M. Dubdubbi P.	.....	Common on South towards Champasaree.
19	Craton Candatus ...	.....	.....	Large shrub common on the banks of streams towards the North, *e. g.* Choonglong Jhora.
20	Heynea quinquejuga ...	Cherenjee ...	.....	One specimen only found in Choonglong R.
21	Homoroya ...	Mairi ...	.....	Ditto ditto ditto.
22	Pongamia glabra ...	.....	.....	One specimen seen. Large tree.
23	Ficus obtusifolia ...	.....	.....	One found in Choklong Jhora.
24	Ficus Roxburghii ...	.....	.....	Ditto ditto.
25	Ficus glomerata ...	.....	.....	Common in most places.

No. 7.

FORM I.—*Statement showing the trees growing in the Mahanuddy Khair Forest, along the right bank of the Mahanuddy River.*

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Acacia Catechu, Willd. ...	Khair ...	.....	Some of large size on the higher parts; forms thick forest towards the river. Not used by natives even to extract khair.
2	Dalbergia Sissoo, Roxb. ...	Sissoo ...	.....	Generally scattered about 1 to 5 khair; a few large ones on the higher parts.
3	Bombax Malabaricum, D. C.	Semul ...	.....	Common towards the West.
4	Odina Wodier, Roxb. ...	Hulloray ...	.....	Large tree; common near Camp Mahanuddy; flowers in April, when leafless.
5	Albizzia cleta Benth ...	Safeid Siris ...	.....	Generally spread over the forest.
6	Cedrela Toona, Roxb. ...	Toon Tooni P. ...	.....	A few small trees here and there.
7	Trewia nudiflora ...	.....	.....	Two good sized trees on Silligoree Road.
8	....	Gineri ...	.....	Common small tree; wood used to strike fire.
9	....	Padigny ...	.....	Ditto ditto.
10	Holarrhena frubescens Wall	Dudhkoori ...	.....	Both common throughout the forest.
11	„ Antidy venterica Wall	Dudhali ...	.....	
12	Ficus cunea Buch ...	Kannai ...	.....	One or two at the foot of the hills.
13	Gmelina arborea, Roxb. ...	Gambari ...	.....	Ditto ditto.
14	Grewia elastica Royle ...	Sealposira ...	.....	A few trees seen.
15	Garuga pinnata, Roxb. ...	Gia M. Dubdubbi P.	.....	A few near the Camp.
16	Acacia rugata ...	Hurrari kanta ...	.....	Very common large thorny shrub.
17	Capparis olacifolia H. S. & T.	Huis P. ...	.....	Ditto ditto.

No. 8.

FORM I.—*Statement showing the trees growing in the Moorgong Sookna Sal Forest, between Moorgong village and the Cart road.*

No.	Systematic name.	Native name.	Size when full grown.	REMARKS.
1	Shorea robusta, Roxb. ...	Sal Sukwa, M. ...	.....	Grows very well, especially towards Sookna.
2	Terminalia glabra, W. and A.	Saj ...	.....	Not many trees found.
3	Terminalia Bilerica, Roxb....	Buhura ...	.....	Common tree, but small size.
4	Terminalia Chebula, W. and A.	Hurra ...	.....	Ditto ditto.
5	Lagerstræmia parviflora, Roxb.	Suda ...	.....	Ditto ditto.
6	Bombax Malabaricum, D. C.	Semul ...	.....	A few large trees near dragging path and Moorgong tea garden.
7	Dillenia pentagyna, Roxb. ...	Tatri P., Akshi M.	.....	Not many trees of large size.
8	Sterculia villosa, Roxb. ...	Oodal ...	.....	Pretty common.
9	Sterculia colorata, Roxb. ...	Omra ...	.....	A few near Moorgong tea garden.
10	Careya arborea, Roxb. ...	Koombi ...	.....	Common throughout the forest.
11	Eugenia Jambolana, Roxb....	Jamun ...	.....	Common.
12	Eugenia ...	Kiamoni ...	.....	Ditto.
13	Callicarpa arborea, Roxb. ...	Goehlo P., Jamti M.	.....	Very common.
14	....	Latikar ...	.....	Common small tree.
15	Calesanthes Indica Bl. ...	Totilla M., Karamkanda P.	.....	Many small trees near dragging path.
16	Acacia ferruginea D. C. ...	Khoul ...	.....	Common.
17	Cassia fistuala L.	Amultas ...	.....	Found towards the hills.
18	Elæocarpus rugasus ...	... .	.....	Large tree; one or two found in Hattisurra R.
19	Micromelum pubescens ...	.....	.....	One found in Hatisurra R.
20	Castanea Sp.	Katoos ...	.....	Ditto ditto.
21	Grewia elatica Royle ...	Scalposera ...	.....	Common small tree.
22	Zizyphus rugosa	Harray Baer ...	.....	Ditto.

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FORM No. 2.

Valuation Surveys in the Mahanuddy Terai Range.

No. 1. Teesta and Sivoke Sissoo forest.

„ 2. Shummur Danga Sâl forest.

„ 3. Singaree Pahar Mixed Plain forest.

„ 4. Sivoke Sâl forest.

„ 5. Gulma-Goroomara Sâl forest.

„ 6. Champasaree Jhar Sâl forest.

„ 7. Mahanuddy Khair forest.

„ 8. Moorgong Sâl forest.

No. 1.

Statement showing the result of Forest Valuation Surveys in the Teesta and Sivoke Sissoo Forest, 322 acres, 1 rood, 8 poles.

No.	Position of Line of Survey.	TREES MEASURED.																	Area of survey in acres.	Remarks.
		Sissoo.					Khair.				Sal.		Saj.			Sitsal.		Toon.		
		I.	II.	III.	IV.	V.	I.	II.	III.	IV.	I.	II.	I.	II.	III.	I.	II.	I.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	A. R. P.	
1	Road from Sivoke to Silligoree from the Sivoke river to edge of mixed forest, 860 feet	262	46	...	...	...	42	5	...	...	1	...	...	...	...	...	...	.....	1 3 36	All small trees, with long grass and wild plaintains.
2	A zigzag line from the edge of Sivoke river to edge of mixed forest, across a bend to mixed forest again, then back to Sivoke Jhora, 3,800 feet.	470	85	13	6	...	6	20	3	1	7	...	...	...	...	...	...	1	8 1 0	At first pretty clear, with some good straight well-grown young sissoo, then a patch of thick very tall grass with nothing, then a few largish trees and some long grass. Many dead trees of sissoo and sirris lying about on the ground.
3	From a point on Sivoke river south to edge of mixed forest, 390 feet.	20	8	8	2	...	...	1	1	...	1	...	...	...	...	...	1	....	0 3 23	Forest pretty good; a few large trees.
4	From a point on line No. 2 north to edge of Sivoke river, 1,200 feet.	200	28	8	...	...	2	7	...	1	...	...	...	...	...	...	...	.....	2 3 1	Long grass, with a few seedlings in marshy ground.
5	Slanting line from point where Sivoke river leaves the hills to the edge of mixed forest close to a point on the line No. 6 of Singaree Pahar mixed forest, 3,000 feet.	40	43	40	17	2	1	...	...	...	1	1	1	...	1	2	1	.....	6 3 22	At first the forest was good, but afterwards tall grass was met with, and very few trees were found. Many different species of other trees observed.
6	From point where Sivoke river leaves hills south to mixed forest, 700 feet.	2	3	4	2	...	...	...	...	...	...	...	...	5	...	...	...	.....	1 2 17	Forest chiefly of big trees of the Lower Hill kinds, with a few sissoo.
7	Left bank of Sivoke river across a bend, 1,260	284	38	...	...	...	12	4	1	...	1	...	...	...	...	...	...	.....	2 3 22	Very long tall grass, with young sissoo; difficult to penetrate.
8	Through Sivoke plain, 1,950 feet	1,681	26	1	...	...	...	...	...	...	...	...	...	...	...	...	...	.....	4 1 36	Very long grass, with thick crop of young sissoo; low ground to north, but rises as it approaches the Teesta.
9	From opposite Sivoke Bungalow to a point on the Teesta south-east 1,870 feet.	270	87	...	...	...	20	9	1	...	...	...	...	...	...	...	...	2	4 1 7	Good piece of young sissoo about 20 feet high at first, afterwards long grass and a few khair.

10	From a point on No. 9 south to a branch of Teesta river, 1,120 feet.	306	126	5	1	...	10	27	7	...	...	...	...	...	...	...	...	2	2 2 11	Very good piece of sissoo trees; pretty straight, and very little grass.
11	From a point on Teesta river south-west to a nuddy forming boundary of Shummur Danga forest, 366 feet.	14	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	0 3 14	Long grass, with hardly any trees.
	Total	3,549	496	79	28	2	93	73	13	2	11	1	1	5	1	2	1	7	.....	

Contents of forest.

	Saj.	Sissoo.	Khair.	Total
Young trees (3' to 4' 6")	8	679	112	799
Trees (4' 6" to 6')	.....	240	17	257
Old trees (above 6')	.....	17	.....	17
Total	8	936	129	1,073

No. 2.

Statement showing the results of Forest Valuation Surveys in the Shummur Danga Sal Forest, 522 acres, 1 rood, 5 poles.

No.	Position of Line of Survey.	TREES MEASURED.																				Area of survey in acres.	Remarks.
		Sal.					Saj.									Chalownee.			Sitsal.				
		I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	I.	II.	III.	I.	II.	III.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Under 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	A. R. P.	
1	Line from a point in a line nearly east and west from the Singaree Pahar mixed forest to the Jhenaikhoorie nuddy, thence slightly northwards to a branch of the Teesta, 3,970 feet.	254	85	46	13	...	21	28	29	29	11	2	1	...	1	1	2	1	...	...	...	9 0 28	The line first passed through a patch of clear grass, then through a young sal forest, good, but much troubled by creepers, then through more grass, then through a saj forest with some fine trees, and a great many jamun, afterwards a poor sort of mixed forest with a few sal here and there. Very many creepers, some of enormous size.
2	Line from a point 1,022 feet from the beginning of No. 1 in a N. E. direction to a branch of the Teesta, 2,800 feet.	275	17	6	...	1	7	12	13	12	7	1	...	...	...	...	...	...	...	...	...	6 1 28	First through a young sal forest, then through a good deal of long grass, some good saj forest and a mixed forest with one or two sal trees to the edge of the branch of the Teesta. Many creepers.
3	From the foot of the Singaree Pahar on line No. 1, S. E. general direction to the second boundary post below the ridge, 6,652 feet.	1,500	443	151	8	1	75	46	14	4	...	...	...	...	...	...	1	...	3	2	1	15 1 3	First through sal forest, which had lately been burnt over, then good high forest, and afterwards part of the site of an old Mechia village, then alternate green and sal forest to the edge of the mixed forest.
4	From the border of the Sissoo forest close to the Teesta river south-west to the Singaree Pahar, 3,085 feet.	173	29	20	3	...	29	44	23	15	6	1	...	...	...	...	...	...	...	...	...	7 0 13	The line passed through bands of grass forest and occasional choked up nullahs, and sal and saj forest of pretty good appearance though the creepers were very bad.
	Total ...	2,202	574	225	24	2	132	130	79	60	24	4	1	...	1	1	3	1	3	2	1	37 3 32	

Contents of forest.

	Sal.	Chalowanee.	Saj.	Sitsal.	Total.
Young trees	3,091	14	1,085	14	4,204
Trees	330	.....	824	.....	1,154
Old trees	27	.....	412	.....	439
Total ...	3,448	14	2,321	14	5,797

No. 3.

Statement showing the results of Forest Valuation Surveys in the Singaree Pahar Mixed Plain Forest, 270 acres, 1 rood, 21 poles.

No.	Position of Line of Survey.	TREES MEASURED.																												Area of survey in acres.	Remarks.
		Sal.					Toon.					Saj.						Chalowner.						Katoos.					India rubber.			
		I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	VI.	I.	II.	III.	IV.	V.	VI.	I.	II.	III.	IV.	V.	Mature.	Seedlings.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.			A. R. P.	
1	South-east from Singaree Pahar to edge of Shummur Danga, 2,302 feet.	...	2	...	1	1	1	...	...	...	...	1	1	...	...	...	...	...	1	...	...	...	...	145	45	11	3	1	...	...	5 1 6	The slope of the Singaree Pahar is at first gentle, then steeper. The Rewahee Jhora runs at its base in a dense cane brake with very swampy ground, and trees of different species, afterwards the forest becomes more open, and some good Katoos and Saj are met with, then crossing a strip of grass the mixed forest is entered again, with more Katoos.
2	From the top of Singaree Pahar to edge of Shummur Danga, continuing No. 4 of Shummur Danga forest, 1,350 feet.	5	1	1	...	...	2	...	...	...	...	...	1	...	2	4	...	...	...	...	...	...	...	9	6	2	...	...	1	1	3 0 16	The same characteristics as the other parts of the forest. The rubber was *Ficus obtusifolia*. The first part near Shummur Danga was pretty dry, and some good saj trees were found.
3	From top of Singaree Pahar to foot of ridge, thence two lines to the two lines Nos. 1 & 3 of Shummur Danga Sal forest, 850 feet.	4	2	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	...	...	...	...	2	1 3 25	The same as the other parts, but fewer good trees, and a dense cane growth. The rubber, as in line No. 2, was *Ficus obtusifolia*, an almost useless kind.
4	Along the road from Sivoke to Silligoree from edge of Sissoo forest to top of Singaree Pahar, 1,130 feet.	50	20	3	1	...	4	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2 2 15	Ground not being swampy, consequently more sal and saj, with a few toon; gradual ascent.

No. 3.—(*Continued.*)

No.	Position of line of Survey.	TERMS MEASURED.																												Area of survey in acres.	Remarks.
		Sal.					Toon.					Saj.						Chalownee.						Katoos.					India rubber.			
		I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	VI.	I.	II.	III.	IV.	V.	VI.	I.	II.	III.	IV.	V.	Mature.	Seedlings.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.			A. R. P.	
5	From the top of the Singaree Pahar and north to the edge of Sivoke Jhora Sissoo forest, 760 feet.	...	...	...	...	...	7	2	2	2	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...	2	1 2 39	A very good bit of forest; the rubber seedlings were of the true kind (*Ficus Elastica*), and the Toon trees very good.
6	From a point in a small nuddy to edge of Sissoo forest, 850 feet.	...	...	...	...	...	7	2	...	...	1	...	...	...	...	...	1	...	1	...	...	...	...	3	1	...	...	...	...	...	1 3 32	Very good forest, fit for the growth of India-rub ber; chiefly on a gentle slope, then swampy.
7	From the edge of the Sissoo forest in general south-east line crossing No. 6 to the Singaree Pahar District, 1,000 feet.	...	...	...	...	...	7	3	...	1	1	...	...	...	...	...	...	..	...	...	...	...	...	9	1	...	...	1	...	...	2 1 7	Moist, slightly swampy, rising in a gentle slope on the hill, where a few good Toon were found.
	Total ...	59	25	5	2	1	30	8	2	3	2	1	2	1	3	4	1	...	2	...	...	...	1	171	54	13	3	2	1	5	18 3 20	

Contents of forest.

	Sal.	Chalownee.	Saj.	Toon.	Katoos.	Total.	India-rubber.
Young trees	71	.....	14	28	185	298	Seedlings ... 71
Trees...	28	.....	43	43	43	157	Old trees ... 14
Old trees	14	14	71	28	28	155	.....
Total ...	113	14	128	99	256	610	85

No. 4.

Statement showing the results of Forest Valuation Surveys in the Sivoke Sal Forest, 1,553 acres, 2 roods, 33 poles.

No.	Position of Line of Survey.	TREES MEASURED.																						Area of survey in acres.	Remarks.
		Sal.								Chalowner.					Saj.					Sitsal.			Toon.		
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	I.	II.	III.	I.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	A. R. P.	
1	Road from Sivoke to Silligoree, from the beginning of Singaree Pahar to Bycuntopore forest Boundary, 13,324 feet.	3,888	810	315	122	14	.	...	...	3	6	4	4	5	12	1	...	...	...	...	...	...	.....	30 2 14	At first the forest is very good, clear of grass, and with an undergrowth of seedlings and small shrubs; the sal trees with good upright stems, and not suffering from the effects of fire. Afterwards the grass gradually appears, and the state of the forest decreases, till towards the boundary line; the trees are few, stunted or much knotted and twisted, and the grass beneath very dense.
2	Road leading from a point on the Silligoree road, distant 11,290 feet from Sivoke, to edge of the forest toward Mahanuddy, 3,673 feet.	1,956	290	85	13	5	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	.....	8 1 29	Long grass nearly all the way; towards the hill, which forms the boundary, there is not so much, but the state of the trees is the same throughout. A few big trees, but hollow inside—all the sal evidently suffering from the effects of the yearly jungle fires.
3	A line across the forest nearly East and West from a point 1,100 feet N. of the junction of the roads from Sivoke to Silligoree and Mahanuddy, both ways, 6,230 feet.	3,646	483	135	25	6	..	1	1	2	9	9	3	3	55	5	2	...	2	...	...	...	.....	14 1 4	This line begins in a pretty good forest on the edge of the Singaree Pahar, with very little grass, but a great many creepers, and going westwards passes through patches, some with a few good sal trees with straight stems, and others with scarcely any thing but very long grass; toward the Goroomara River the forest is rather better, and the sal and chalownee trees are good.

No. 4.—(*Continued.*)

No.	Position of Line of Survey.	TREES MEASURED.																						Area of survey in acres.	Remarks.
		Sal.								Chalownee.					Saj.					Sitsal.			Toon.		
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	I.	II.	III.	I.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.		
4	From a point 4,500 feet distant from Sivoke in a line east to the Goroomara Hills.	2,940	186	125	18	...	...	...	...	1	6	...	...	...	7	1	...	...	...	31	3	1	1	A. R. P. 12 2 20	For the first 3,000 feet very good forest, fine sal with straight stems, and many other species of trees in Form No. 1. Afterwards, and crossing a jhora, long grass and poor forest with one or two sal trees and a few sitsal; has the appearance of having been formerly under cultivation.
	Total	12,430	1,759	660	178	25	...	1	1	8	21	13	7	8	74	7	2	...	2	31	3	1	1	65 3 27	

Contents of forest.

	Sal.	Chalownee.	Saj.	Sitsal.	Total.
Young trees	15,543	306	47	71	15,967
Trees	4,193	165	.....	24	4,381
Old trees	636	188	47	.....	871
Total ...	20,371	659	94	95	21,219

No. 5.

Statement showing the results of Forest Valuation Surveys in the Gulma-Goroomara Sal Forest, 195 *acres,* 1 *rood,* 32 *poles.*

No.	Position of Line of Survey.	Trees Measured.														Area of survey in acres.	Remarks.
		Sal.					Saj.			Chalownee.				Sitsal.			
		I.	II.	III.	IV.	V.	I.	II.	III.	I.	II.	III.	IV.	I.	II.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Under 1 cubit.	Between 1-2 cubits.		
1	Along the road from Sivoke to Mahanuddy, crossing the Gulma River, 3,159 feet.	312	85	31	1	1	5	3	2	1	.....	1	1	.....	.....	A. R. P. 7 1 0	First a piece of low ground with very little but tall grass, then a ridge with a pretty good sal forest, afterwards grass jungle, and beyond the Gulma forest with very few good species.
2	From a point on the road in a north-westerly direction to the Chuckoogheesa jhora, 2,950 feet.	2,134	96	44	4	2	6	.....	5	.....	.....	.....	.....	2	.....	6 3 2	The line rises in a slope to the top of a ridge, then through good sal forest till it descends to grass jungle with very few trees.
3	From the junction of the Gulma and Goroomara Rivers in a north-east direction across a bend of the Goroomara River, 1,300 feet.	20	2	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1 3 37	Very poor forest, hardly a tree to be seen but a few large semul. All long grass.
	Total	2,466	183	80	5	3	11	3	7	1	.....	1	1	2	.....	15 3 39	

Contents of forest.

	Sal.	Chalownee.	Saj.	Total.
Young trees	875	.....	85	960
Trees	61	12	.....	73
Old trees	37	12	.....	49
Total	973	24	85	1,082

No. 6.

Statement showing the results of Forest Valuation Surveys in the Champasaree Jhar Sal Forest, 1,670 *acres,* 2 *roods,* 28 *poles.*

No.	Position of Line of Survey.	TREES MEASURED.																	Area of survey in acres.	Remarks.
		Sal.						Saj.		Chalowner.		Sitsal.		Khair.		Sissoo.		Toon.		
		I.	II.	III.	IV.	V.	VI.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	Between 1-2 cubits.	Under 1 cubit.	A. R. P.	
1	From the foot of the hills crossing the Sivoke road southwards to the edge of the Mahanuddy, 3,060 feet.	160	24	1	...	...	...	14	1	.....	...	...	...	...	2	...	...	.....	7 0 4	A very poor part of the forest; along the edge of the steep bank of the Mahanuddy is a tangled thick forest of no value.
2	From the point on the Mahanuddy, where left off No. 1 eastwards to edge of Chandrie's Bhita, 2,050 feet.	257	77	3	...	...	...	...	...	.....	...	...	...	...	...	...	...	.....	4 2 33	Forest very bad, long grass except just now, when it has all been burnt by jungle fires—March 28th.
3	From a point on Choongloong Jhora and the Sivoke road southwards to the edge of the Mahanuddy, 5,404 feet.	80	192	40	2	...	...	...	...	.....	...	8	2	...	...	...	...	.....	12 1 25	Very bad at first, afterwards slightly better as the line gets further south.
4	From a point on the Mahanuddy straight across to the Gulma River, 9,470 feet.	700	242	55	10	...	...	...	...	1	1	4	2	...	...	...	...	.....	21 2 33	At first bad, gets better and better as the line gets towards the west, crossing some very good patches of fine straight sal, but very few of any size.
5	Along the Choklong Champasaree Timber road, 8,375 feet.	500	236	126	3	...	1	...	...	.....	...	...	...	3	2	1	1	.....	19 0 36	Bad towards the north, but the road crosses some patches, which are pretty good towards Champasaree.
6	Line east and west across the forest near the Gulma River, 3,600 feet.	380	82	12	1	...	...	...	...	.....	...	...	...	...	...	...	...	.....	8 1 2	A pretty good young forest, no old trees, cultivation (Mechi) of rice, &c., on either boundary.
7	Line along the Sivoke road from the Choklong river to the edge of the Mahanuddy, 4,100 feet.	203	38	3	1	...	...	9	1	.....	...	1	...	...	...	...	...	1	9 1 26	A bad bit of forest, long grass and small trees of no value; a little piece at the edge of the Mahanuddy is somewhat better.
	Total	2,230	891	240	17	...	1	23	2	1	1	13	4	3	4	1	1	1	82 3 4	

Contents of forest.

	Sal.
Young trees	4,824
Trees	342
Old trees	20
Total	5,186

No. 7.

Statement showing the results of Forest Valuation Surveys in the Mahanuddy Khair Forest, 573 acres, 16 poles.

No.	Position of Line of Survey.	TREES MEASURED.											Area of survey in acres.	Remarks.
		Sissoo.				Khair.				Toon.				
		I.	II.	III.	IV.	I.	II.	III.	IV.	I.	II.	III.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.		
													A. R. P.	
1	Along the road from camp Mahanuddy to Silligoree as far as the ridge forming the boundary of the forest, 5,400 feet.	24	134	53	3	296	413	101	7	4	.....	1	12 1 23	A very good Khair forest along the ridge along which this road runs. The trees are old and many of them fit to cut, either for general purposes or the extraction of "cutch."
2	From the foot of the ridge along the road to the edge of the Mahanuddy river from Moorgong Bustee, 2,000 feet.	8	8	7	.....	619	209	14	1	.....	.....	.....	4 2 15	The road descends gradually to the river; as it descends the large trees disappear, and their place is taken by a thick mass of thorny khair and shrubby plants.
3	From a point half way along No. 2 in a south-east direction to the edge of the Mahanuddy river, 5,554 feet.	252	22	.....	.....	2,507	360	10	.....	.....	.....	.....	12 3 0	Through a dense forest of young Khair, very difficult to penetrate, but capable, if not too much spoilt by the sudden floods of the river, of becoming a good forest.
	Total ...	284	164	60	3	3,422	982	125	8	4	.....	1	29 2 38	

Contents of forest.

	Sissoo.	Khair.	Toon.	Total.
Young trees	1,146	2,387	19	3,552
Trees	57	153	.....	210
Old trees	.....	.....	.....	.....
Total ...	1,203	2,540	19	3,762

No. 8.

Statement showing the results of Forest Valuation of Surveys in the Moorgong Sal Forest, 762 acres, 2 roods, 15 poles.

No.	Position of Line of Survey.	Trees Measured. Sal. I. Under 1 cubit.	Sal. II. Between 1-2 cubits.	Sal. III. Between 2-3 cubits.	Sal. IV. Between 3-4 cubits.	Saj. I. Under 1 cubit.	Saj. II. Between 1-2 cubits.	Saj. III. Between 2-3 cubits.	Area of survey in acres.	Remarks.
									A. R. P.	
1	From the road from Sookna to Mahanuddy east to the Choklong Jhora, 1,640 feet.	20	14	5	...	1	1	.....	3 3 2	Very poor forest; passes close to the spot where some Teak seedlings were planted out some years ago.
2	Along the road from Mahanuddy to Sookna Bustee, 3,871 feet...	590	86	30	5	5	2	2	8 3 22	Bad at first, much long grass; improves after crossing Choklong Jhora, and at the end there is some pretty good young sal.
3	Along the road from the end of No. 2 back to old Sookna Haut, 1,230 feet.	54	78	32	3	1	... ..	.....	2 3 11	Forest fair, some good well grown young sal trees; grass jungle towards Punchenaie river.
	Total	664	178	67	8	7	3	2	15 1 35	

Contents of forest.

	Sal.	Saj.	Total.
Young trees	3,410	101	3,511
Trees	407	....	407
Old trees	.....	...	... ..
Total	3,817	101	3,918

Note.—It has been laid down that 10 per cent. of the area of forests under 1,000 acres, and 5 per cent. of those of 1,000 acres and upwards, shall be surveyed. This rule has not been strictly adhered to owing to want of time during the present season. A few additional surveys will have to be made during the next season.

Pankabaree,
The 1st July 1873.

J. S. Gamble, B.A.,
Assistant Conservator of Forests, Sikkim Sub-Division.

APPENDIX E.

No. 82C, dated Gowhatty, the 14th June 1878.

Memorandum on the system of keeping Plantation Records.

As it is desirable to keep an exact record of plantation operations with the view of forming, in course of time, a history of the artificial forests, the following rules have been drawn up for the guidance of the forest officers in charge of plantation work.

2. The information to be recorded should be divided into three classes in the subjoined manner:—

I.—General Description of the Plantation Tract.

For this purpose the area to be planted should be surveyed and examined in detail.

1*st*.—Area of tract in acres.

a.—Area available for planting.

b.—Area unfit for planting, watercourses, roads, &c.

c.—Total area.

2*nd*.—Boundaries, and the properties with which they march.

3*rd*.—Topographical description.

4*th*.—Soil and substratum (geological description).

5*th*.—Climate.

a.—Average rainfall in inches.

b.—Annual mean temperature.

c.—Ditto ditto of the four coldest months, November to February.

d.—Highest temperature.

e.—Lowest temperature.

f.—Prevailing winds.

These data should be obtained from the nearest station where observations are recorded, and it should be stated whether, and in what way, the climate at the plantation tract is likely to differ.

6*th*.—Description of the vegetation as to species; and, if forest, also as to age and condition.

7*th*.—Timber markets in the vicinity; their distance from the plantation tract; kind and estimated amount of material required per year by the surrounding population; sources available to supply these wants; present and prospective price of forest material.

8*th*.—Lines of export, with special information regarding the means of water carriage.

9*th*.—Detailed information regarding the labor available in the vicinity of the plantation tract; also price of labor.

10*th*.—A map of the plantation tract on a scale of 4 inches to the mile exhibiting the topographical features. This map should contain a marginal sketch on a small scale, say 16 miles to the inch, exhibiting the relative position of the plantation tract to the surrounding timber markets; and the lines of export.

II.—General Plan of Operation.

1*st*.—Formation of compartments and blocks. On level or undulating ground the compartments should have the shape of a square, and contain a maximum area of 100 acres each. On hilly ground the shape of the compartment depends on the configuration of the country. Each compartment should be surrounded by a road, as a rule 15 feet broad. This network has to be fixed at once, by laying down two base lines crossing each other at right angles at a fixed point, and the compartments are formed by degrees, as the plantation proceeds, by laying out the roads parallel with the base lines and at equal distances in the plains, or according to the configuration of the surface in the hills. A square with a side of 2,087 feet is equal to 100 acres (as near as required). The unity of management is the compartment; but in plantations of 10,000 acres and over, they should be grouped in blocks, each comprising as a rule a maximum area of 5,000 acres. Blocks should be indicated, in the records as well as in the map, by Roman figures I, II, &c, and, if possible, by names; compartments receive as a rule only Arabic figures 1, 2, 3, &c.

2*nd*.—Area to be planted per year, and succession according to which the several compartments are to be planted.

3*rd*.—Enumeration of trees to be planted, and description of the method to be followed.

4*th*.—Estimated cost per acre during the first five years, arranged according to the following headings:—

a.—Purchase of land.

b.—Working charges.

c.—Establishment.

d.—Total per acre.

III.—Record of Operations.

1*st*.—Detailed register of areas.

As the information of compartments and the actual planting proceeds, the areas must be entered. If it takes more than one year to plant one compartment, sub-compartments must be distinguished by adding the letters *a*, *b*, *c*, &c., to the number of the compartment. This register will ordinarily occupy only one sheet of paper.

2*nd*.—The area planted each year should be entered on the map by a distinguishing wash, namely :—

Plantations of sâl, *shorea robusta*, by a "green" wash with an S in black.
„ of teak, *tectona grandis* „ „ T „
„ of mahogany, *swietenia mahogany* „ M „
„ of sisu, *dalbergia sissoo*, by a "lake" „ D „
„ of khair, *acacia catechu*, „ „ „ A „
„ of toon, *cedrela toona*, „ "sienna" „ C „
„ of India-rubber trees, „ „ „ R „
Mixed plantation of the above by a "sienna" with the respective initials.
Plantations of conifers, by an "indian ink" wash.
„ of temperate trees, by a "cobalt" wash.

3*rd*.—The work done in each compartment has to be recorded on a separate sheet of paper. This sheet receives as its superscription the name of the plantation, name and number of the block, number of compartment and its area. The first entry consists of a concise description of the formation of the plantation, year and month, method followed, and detailed expenditure. Subsequently, every operation performed in the compartment, of whatever description, is entered, whether pruning, thinning, clearing, or any other work. The material removed has to be given in cubic feet, separated according to timber and fuel, as also the cost of removing it and the amounts realized, whether from wood or any other forest produce. In addition, all information of interest concerning the one compartment is entered here. If one sheet is covered, a second and third is attached. The records of the blocks and compartments are arranged according to their number.

4*th*.—Summary of revenue and expenditure for the whole plantation, arranged according to the general budget headings, sub-divided according to circumstances, and in such a manner as to show the cost of the different works.

5*th*.—A record in which all points of importance and of interest concerning the plantation "as a whole" are entered as they occur.

6*th*.—If the plantation is in charge of an officer competent to do so, meteorological observations should be made regarding the following subjects :—

a.—Barometrical pressure.
b.—Rainfall.
c.—Temperature.
d.—Direction of wind.
e.—State of sky, whether cloudy or not.

These observations should be made in accordance with the general directions issued by the Meteorological Department.

3. The information indicated under I and II has to be collected and drawn up before any planting operations are commenced. As soon as it is complete, it should be laid before the Conservator of Forests, who will submit it with his opinion to Government, and obtain sanction to undertake the formation of the plantation, if he considers the conditions favorable.

4. After sanction has been granted, the plantation will be commenced according to the plan laid down under II, or according to such alteration as may be made by Government or the Conservator of Forests, and no deviation from the fixed plan is allowed without the sanction of the Conservator of Forests. The records enumerated under III must then be laid out at once, and the entries made as the work proceeds.

5. The plantation records should not be kept in a book, but in loose sheets in a substantial portfolio of the size of a foolscap sheet. The latter system is preferable, as it allows sheets to be inserted wherever necessary, and at the same time the records are not swelled by blank paper. The several papers and sheets should always be arranged according to the manner indicated above.

6. Divisional forest officers will be held responsible that the records are kept in the proper way, and the Conservator of Forests will examine them whenever an opportunity arises.

7. A copy of the entries in the plantation record during each official year should be appended to the annual administration report of the division.

W. SCHLICH,
Conservator of Forests, Bengal.

APPENDIX.

No. 217 GT, dated Shillong, the 19th July 1873.

From—Colonel Henry Hopkinson, Governor-General's Agent, North-East Frontier, and Commissioner of Assam,

To—The Secretary to the Government of Bengal, Revenue (Forests) Department.

I have the honor to submit herewith the annual report on the Assam Forest Administration for the year 1872-73, drawn up by Mr. Mann, Assistant Conservator of Forests for the Assam Division.

2. To determine what scope forest conservancy should have in Assam, the nature of the actual forest growth must be well understood. We must picture to ourselves a large tract of country thinly peopled, and therefore but partially cultivated; the cultivation of two kinds,—wet land cultivation, on ground which in its natural state is covered with reeds and gigantic grasses—and this cultivation only is permanent—and high land cultivation, which, except in the case of tea, is constantly shifting and breaking up fresh ground, so that though the actual quantity of land occupied at one time may be comparatively small, the quantity which has been denuded of its forest growth within a period too recent to allow of the full regeneration of such growth represents the occupancy of a dense population. So while there are few timber trees that do not require more than half a century for their development, the portions of forest that have been untouched in Assam for half a century and upwards are few and far between; and hence when a forest area of 4,000 square miles is estimated for Assam, it must be remembered that the greater part of this is what a forester would reckon to be mere rubbish. There is further some reason to suppose that Assam is not naturally very prolific of trees valuable in their primary use as timber, and in this respect the province contrasts most unfavorably with British Burmah. Sâl, which is confined to the lower districts of Assam, is pretty well the only really first-class timber tree we have; while in British Burmah, setting aside teak, there are many sorts of timber trees quite entitled to be reckoned first class, some even superior to sâl, though they have failed to obtain repute from having to sustain competition with teak. It would seem that the soil and climate of Assam were more favorable to trees having secondary uses,—valuable not for what could be made directly with them, but for what could be got out of them—what they yielded—as tea, caoutchouc, the trees that feed the lac insect or the silkworm. Again, in certain parts of Assam conditions of soil and climate appear so favorable to the growth of first-class timber trees, that their present scarcity is not of itself sufficient to discourage attempts to plant and propagate them.

3. I should read Mr. Mann's report, then, in the light of the ideas which have suggested the foregoing remarks; and to begin with. They explain the policy of conservancy that has been pursued, namely, to reserve, and reserve strictly, what we could find of really merchantable timber growth, and to leave the rest to the uses of the local population, controlling them so far as might be to their greatest benefit; as, for instance, while allowing ample areas for "jooming," restricting "jooms" in the vicinity of towns or comparatively well-peopled localities, where the supply of fuel was more necessary to the people than the "joom." I ought to add, however, that even in these open forests there are certain trees which are not allowed to be felled at discretion, and on which a certain duty or royalty is levied.

4. The only work performed under this head was the inspection of the Jynteah forests by Mr. Shakespeare, who was sent up to me during the rains from Dacca, and, as it were, while he was awaiting his transfer to the Punjab—an interval of a couple of months, at the worst season of the year. He did as much as could have possibly been expected of him, but a more searching examination of the Jynteah forests will be required before a final judgment on their treatment can be concluded; meanwhile it does not seem that they promise much.

Section I.—Inspection of Forests. Assistant Conservator's report, para. 11.

5. Three reserves were settled in the Kamrup district during the year, embracing an area of 38½ miles, and all consisting of sâl of very fair average class. It is proposed to establish a timber depôt on the Koolsee for these reserves.

Section II.—Reserves. (Assistant Conservator's report, para. 40.)

6. An extract of the remarks of Mr. Mann on the subject of the Jeerung forest will be forwarded to the Deputy Commissioners, Khasi and Jynteah Hills, with instructions to try and come to some arrangement in the sense indicated by the Assistant Conservator, and to report thereon.

Assistant Conservator's report, para. 65.

7. In the Nowgong forests three reserves have been selected, aggregating 75¾ miles in area. One, the Kolahaut reserve, 7½ square miles, is almost exclusively sâl of excellent growth, but small, third class trees and under in fact; the second, the Daboka forest, 3¼ miles, is also chiefly sâl, but has been hardly worked, and wants nursing; the third forest in Nowgong—the Mikir forest, as it has been called—is 65 miles in area, and is a mixed evergreen forest; it constitutes the only good forest tract remaining to Nowgong.

Nambur reserve. Assistant Conservator's report, para. 93.

8. In the Naga Hills and Sibsaugor districts the Nambur forest has been demarcated and mapped; its area is estimated at 100 square miles. It is an evergreen forest without any sâl in it.

9. All particulars connected with the above reserves are to be found in Mr. Mann's report, and in my letters announcing their survey and demarcation, and reporting them for publication in the Government Gazette; and they are all sanctioned, and are all special reserves in distinction from "open forests," and are under the entire control of the Forest Department.

Durrung reserves. Assistant Conservator's report, para. 103.

10. Three more reserves were selected in the Durrung district on the north side of the Brahmaputra, and along the foot of the Bhutan and Aka hills, but the Government have preferred to defer their recognition until the frontier boundary, now in progress of demarcation, has been finally settled.

Section III.—Plantations. Assistant Conservator's report, para 104.

11. Mr. Mann does not here go into the general question of plantations; this he has treated separately in a special communication on forest operations in Assam, which I shall have the honor of bringing under the notice of the Government so soon as it comes back to me from the revision which I have requested it might undergo. In the account in the section now under notice of the two teak plantations,—one on the Koolsee in Kamrup, of 7½ acres, and the other at Makoom in the Luckimpore district, of 2·85 acres (1¾ acre more was planted but has become worthless), there will, however, be found many particulars of interest. It is to my mind of greater importance that the teak plantation in Kamrup should succeed than that the Makoom plantation should, because in Kamrup plenty of labour is available, while I doubt whether the want of it will not be found an insuperable objection to carrying on plantations on a large scale at Makoom. I doubt if the Government could be prevailed on to contemplate the employment of imported labour for teak plantations, and hitherto the small population about Makoom has shown itself much averse to working for hire.

Section IV.—Yield of Forest. Assistant Conservator's report, para. 126.

12. A small experiment was made in working out some sâl timber from one of the Kamrup forests, which was only partially successful through the failure of the contractor, his failure again being traceable to his not having elephants and fancying he could do the work with men, with whose aid he indeed actually succeeded in getting out 50 logs, but could not get the remaining 100 logs required to complete his contract. Its result was, however, profitable to the Government so far as it went, and showed that at Gowhatty at least, if we worked out timber, we could sell it at a good price, and that there was a good market demand there for it. Mr. Mann is probably right in saying that there can be no successful operations in Assam without elephants, yet he does not seem to have thought about buffaloes, with which at one time and in days gone by all the teak that came out of the Martaban forests used to be worked. But it would not pay a contractor to keep even a team of buffaloes to work out only a hundred or a couple of hundred logs. It is proposed to have two timber depôts in Kamrup,—one on the Koolsee, and one at Gowhatty, and I approve of this. By the side of the timber operations in Upper Assam, however, the experiment at Gowhatty may be regarded as a decided success. I do not know what the history of the Upper Assam depôts is; they were formed, and the wood stored at them felled, before I had anything to say to the department, and I stopped any further work of the kind. I visited one of the depôts; and if the wood I found there was a fair sample, I do not wonder at the Government having incurred loss.

Section V.—Financial. Assistant Conservator's report, para. 146.

13. It will be seen that we sold our sâl timber in Kamrup for more than double what it cost us, but the timber transactions in Upper Assam resulted in a loss of Rs. 2,933-0-11. Mr. Mann says that only the best kinds of timber—fit for building and other purposes—were brought to the Upper Assam depôts; but some timber I saw at the Golaghat depôts was very poor stuff. However, under Mr. Mann's management, and on a proper system, I should not be afraid of not getting a fair profit out of the sale of Government timber in every district of the province.

Section VI, Assistant Conservator's report, para. 153.

14. Mr. Mann reports that forest administration may be said to have advanced a step during the year, and I think it has, and a considerable one. Matters have been got into something like working order; the subordinate forest officers have been no longer vaguely employed, but have had plenty of occupation assigned them with a definite end; and in the large area of forests that have been demarcated, we have really something to show. Then in the teak nursery on the Koolsee, a foundation for plantations has been laid, which may be carried on to any extent, and we have been able to design the Koolsee as a centre for forest operations of every kind. It is situated in the best sâl reserve, and we have a tract near it suitable for the experimental cultivation of caoutchouc, and we propose that it should be the head-quarters of the Lower Assam forest officer.

ANNUAL REPORT ON THE ASSAM FOREST ADMINISTRATION FOR THE YEAR 1872-73.

INTRODUCTORY.

THE division or commissionership of Assam has a population of 1,682,692, and extends over an area of 27,307 square miles, and is divided into the following districts or deputy commissionerships :—

1. The Kamrup district.
2. The Nowgong „
3. The Durrung „
4. The Seebsaugor „
5. The Luckimpore district.
6. The Naga Hill „
7. The Khasi and Jynteah Hill district.

Statistics of districts.

2. The population, area, cultivated lands, waste lands without forest, forest lands, Soom forests, and proportion of the latter used for silk cultivation, are exhibited in Appendix A.

3. The total forest area in Assam after the general inspection was roughly estimated as covering 4,000 square miles, none of which were at the beginning of the year in charge of the Forest Department; for the Nambur forest had only nominally been made over, without its area or boundaries having been defined.

Better forests only placed under the Forest Department.

4. The first step, therefore, in the direction of ensuring an effective management of the Assam forests was to limit the attention and care of the Forest Department only to the better portions of the vast areas covered with forests in Assam.

5. The selection of the better forests had been commenced during the year 1871-72, but none of the forests were definitely placed under the Forest Department before the end of the official year; and during the year 1872-73 this work was continued, and for the time completed, in the Kamrup, Nowgong, and Naga Hill districts.

Open forests managed by the Deputy Commissioners.

6. The forests not selected for special reserves remain under the entire management of the Deputy Commissioners of districts, who have a separate establishment sanctioned for the control of such forests.

Forest officers in Assam.

7. Mr. A. P. Aylmer, Assistant Conservator, has been in charge of the Lower Assam division, comprising the Kamrup, Nowgong, Durrung, and Khasi Hill districts, and Mr. E. Forrest in charge of the Upper Assam division, comprising the Luckimpore, Seebsaugor, and Naga Hill districts.

8. The office for the two divisions was in charge of Mr. Forrest from the beginning of the year 1872 to 31st of August 1872, when Mr. Aylmer took charge of it, as the head-quarters of the Lower Assam division were at Gowhatty, where there are also the head-quarters of the Commissioner of Assam.

9. Mr. Shakespear, the Assistant Conservator of the Dacca division, was ordered to the Khasi Hills on the 6th of July 1872, and reached Shillong on the 2nd of August, where he was occupied with the inspection of the forests on the Jynteah Hills, until he left on the 13th of October under orders to proceed to the Punjab to study the practical details of plantation work under Mr. Ribbentrop, for a period of six months.

10. Mr. G. Mann returned from sick leave to Europe on the 4th of January, and received charge of the Assam division.

SECTION I.—INSPECTION OF FORESTS.

Inspection of Jynteah Hill forest.

11. The inspection of the Jynteah Hill forest was commenced by Mr. Shakespear along the southern slopes, from the Labah river in the south-east to the Panch Poonjee Ilaka in the west of the Jowai district.

The Labah river.

12. The Labah is a considerable river, and suited for floating timber; but the forests on either bank, and especially in the more accessible places, have almost entirely been destroyed by constant jooming, leaving only the steepest rocky portion covered with trees, which, on account of the inferiority and shallowness of the soil, are not of vigorous growth, with only short boles and being generally of small size. The best of these get removed by the villagers in the shape of boats.

The Sunleng river.

13. Higher up, where the river has the name of Sunleng, the forests are, however, superior, containing a larger proportion of the better kinds, and the trees attaining a greater height; but here the river is unfit for floating, so that no export of timber from these parts has been attempted.

The Aphafong river.

14. In the valley of Aphafong, a tributary of the Labah, which joins the latter, a little above Mulaghat bazar, less jooming is carried on, and better forests are still existing, and timber in logs was seen by Mr. Shakespear in the Surmah river, which had been brought from these forests. The Aphafong river is, however, only fit for the transport of timber during freshes.

15. In the valley of the Noongong, another tributary of the Labah river, and coming from the Tonaraga range, the forest is said to have been superior in former years, but has deteriorated greatly of late in consequence of uncontrolled felling carried on by the plains people, who traded in small timber; so that the better kinds of trees are only met with sparingly, except at about a day's journey from the plains towards the top of the range.

The Noongong river.

16. Further west there are the Larun and Rampalung rivers, which are tributaries of the Noongong, and are suited for floating during the freshes near the plains; but the expense of getting out timber of large size is so great, that such operations could not under any circumstances prove remunerative, especially as the superior kinds are comparatively rare.

The Larun and Rampalung rivers.

17. Still further west from the Larun river there are two smaller mountain streams, the Horoi and Hingarea, the slopes on either side of which, however, have been joomed by the villages of Mikur, Umpiang, Titong, Mishnipoor, and Jamain, with the exception of the more precipitous and rocky spurs. The little that remains is used by the inhabitants living at the foot of these hills for domestic and other purposes.

The Horoi and Hingarea rivers.

18. Some felling of small timber is reported to be still carried on by the plains people, who remove it by the Noongong, which it would be desirable to control, since deterioration must be the inevitable consequence of this felling of small trees, and the fact of any trade in timber being carried on proves the utility of these forests.

19. The Mantidu river below Kharkhana is suited for floating large-sized timber; but between the latter place and Burghat there is a rapid, and still higher up there are falls, so that no boats can go. The lands on both banks of the river are constantly being joomed by the villagers.

The Mantidu river.

20. A number of new boats were seen at Pershadwar Poonjee, the material for which had come from the forests on the hills above the villages, where there is sufficient timber left to supply local wants at least.

21. Nagessur or Nahar (Mesnaferrea) occurs on the Mantidu above its junction with the Lauriang, which is only of use to the neighbouring villages, however, as there is not sufficient water in the river for exporting the timber.

22. Mr. Shakespear was not able to inspect the forest east of Burghat on account of the sudden rise of the river, which prevented him getting further than Kharkhana; and from what he could learn, there seemed to be no possibility of floating timber from these parts of Jynteah Hills.

23. In the valley of the Pwang or Rowai, another tributary of the Mantidu, there is comparatively speaking little jooming carried on, and there is sufficient water in the river for floating timbers from these forests, which are somewhat more accessible. West of Jynteah, as far as Theria Ghât, nearly the whole of the land is under *pan* or betel cultivation.

The Pwang or Rowai river.

24. In the valley of the Mangat there is but little timber left on the steep hill sides, and the river is only navigable for a short distance above Darang Poonjee, but boats are brought down from the upper part of the valley.

The Mangat river.

25. The forests in the Umksa valley, to the north-west of the Nongtalong Ilaka, have been almost entirely destroyed by joom cultivation, and but very inferior, stunted trees—chiefly oak—are now growing, which are fit for little else than firewood.

Umksa river.

26. Generally speaking, most of the forests along the foot of the outer slopes of the Jynteah Hills, and especially the more accessible ones on the banks or in the neighbourhood of the larger rivers, have almost entirely been destroyed by joom cultivation; and the only forests for which conservancy has been recommended by Mr. Shakespear are the Pwang, or Rowai, and Apha valleys, as there are no villages. These forests should be more closely examined than it was possible to do in the height of the rains.

Conservancy recommended.

27. In addition to this the early inspection of the range of hills about Nakhara, in the Nurpodulaiship, which is not inhabited either, is recommended by Mr. Shakespear as one of the best forest tracts in the Jynteah Hills.

28. The following ghâts are suggested by the Assistant Commissioner of Jowai for the levying of tolls on produce from the Government forests in the Jynteah Hills:—

Ghâts for the levying of tolls.

One at the mouth of the Apha stream.
„ on the Noongong.
„ on the Hingarea.
„ at Jaliakola on the Mantidu.
„ on the Umsong.
„ on the Rungpani.
„ at Doki on the Mangah.

Higher hill forest.

29. The forests further into the hills are situated as follows :—

In Manso Ilaka.	In Thanpung Ilaka.
„ Thilliang Montang Ilaka.	„ Nurtiang „
„ Ralliang „	

They are all described as generally inferior, containing no really valuable timber.

The Manso Ilaka.

30. In the Manso Ilaka, the only forests still existing are those in the valley of the Montang river, in which pine and oaks are plentiful, but mostly of small size, which is attributed to the rocky and precipitous hill sides occupied by them.

31. As the Montang river runs, like all the other streams, north of the watershed into the Kapilee, which latter has rapids and falls, extending over several miles, at its exit into the plains of Assam, no export of timber could possibly prove remunerative from these forests.

The Thillang Montang Ilaka.

32. In the Thilliang Montang Ilaka the forests are situated in the valley of the Um Lado, where the "kaksia" (*Pinus Khasyana*) is common, as well as the "ratiang dengua," "sursey dengau," "lapiang," and "dingleng."

33. There are very fine pines growing near the village of Shilliang Montang on the Manso side, but the forest is only of small extent.

The Ralliang Ilaka.

34. The slopes east from Shilliang, along the Montang, are well covered with young pines, and also some oak. Pines are also plentiful in Ralliang, but large sized trees are very scarce, and jooming is carried on very extensively.

35. In the Munsar valley, east of Ralliang, pines are also plentiful; but on account of the precipitous hill-sides rather of inferior growth, whilst all the better ground is terraced for rice cultivation. In addition to the pine, "*dengau*" and "*dengwu*" are also prevailing.

The Thanpung and Nurtiang Ilaka.

36. In Thanpung there is, with the exception of a few small patches of inferior forest near water-courses, nothing in the way of forests worth mentioning. In the north-easterly portion of the Nurtiang Ilaka, the hills are still to some extent covered with forest, whilst in the south and south-east the hills are quite barren. In the direction of Larnai the hills are well wooded with oak of small size, but pines are scarce.

Use of the hill forests.

37. These forests have no value except for the supply of local wants, as export would be too expensive, and could not be managed with any reasonable hope of success by these mountain streams. For the supply of timber for building and of firewood for local wants, the better of these forests should, however, be protected against fire, and generally conserved.

Raising of pine forests.

38. The pine seed germinates very freely on lands formerly cultivated, and it is suggested by Mr. Shakespear that such places should be made use of for raising young pine forest, especially in the neighbourhood of Shillong, Jowai, and the larger villages.

39. The names of some of the better kinds of trees noticed are given below :—

Khasi Names.	Bengalee Names.
Laturuai Druga.	Nagussur.
———	Champa.
———	Ping.
Ookrai.	Moroi.
———	Cham (chila).
Suronkah.	Ratah.
Lepiang.	Kunnery.
Lukhint.	———
Lakair.	———
Cherpya.	———
Tokha dengwa.	———
———	(Gundroi) Kundroi.
Yetalong.	———
Gutalog.	———
Dar.	———
Gusek.	———

SECTION II.—RESERVES.

40. The examination of the forests for the purpose of selecting reserves was continued during the year, and carried out by Mr. Aylmer in the Kamrup and Nowgong districts, and by Mr. Forrest in the Naga Hill and Durrung districts.

Enumeration of reserves.

41. The reserves selected as enumerated from west to east are the following :—

In the Kamrup district.

1.	Pantan reserve (sal forest)	12	square miles.
2.	The Bordooar reserve (sal forest)	23	„ „
3.	The Matyekar reserve „	3¼	„ „

In the Nowgong district.

4.	The Kholahaut reserve (sal forest)	7⅛	square miles.
5.	The Deboka reserve „	3¼	„ „
6.	The Mikir hill reserve (mixed evergreen forest)	65	„ „

In the Naga Hills and Seebsaugor districts.

7. The Nambur forest.

Kamrup reserves.

42. All the reserves in the Kamrup district are sâl forests of a very fair average class.

The Pantan reserves.

43. The Pantan reserve is situated in the Pantan and Boejai mouzahs, and the greater portion of it on low detached hills north of the Khasi Hills, on the left bank or the western side of the Koolsee river, which it adjoins for a distance of about six miles.

Area and boundaries.

44. Its area is estimated at 12 square miles.

The boundaries of this reserve are as follow :—

East.—The Koolsee river, from the Bherbhery beel to a Khasi village, which is situated nearly west of Dewalee beel, but on the opposite side of the river.

South.—Along the north bank of the Bherbhery and Lamkarpara beels, which are situated exactly at the foot of the hills, then along the bottom of the hills up to the Koolsee river, and up the Koolsee river to the junction of its feeder, the Dorun ; then along the Dorun to the cultivation of Ookiam round the village, and back to the Dorun, and up the same to its feeder, the Bokoladooar.

West and North-West.—Along the Bokoladooar to its source at the Bural Duga Porbut, then down the Dungai Doonga (which rises in the same hill) to the village of Gunga Dwar; here the boundary leaves the stream and goes along the foot of the hills, skirting the cultivation and paddy lands of Gunga Dwar, Jalookhary, and Bokorabora to the Danga Dwar; then along it through two beels up to the Khasi village.

Soil.

45. The soil is a sandy loam and clay, resting chiefly on granitic rocks, and is of sufficient depth to produce permanently a superior growth of forests, if ordinary judgment is used in working it.

Kinds of trees.

46. The trees in this forest consist almost exclusively of sâl of very healthy and vigorous growth, and with comparatively few other kinds of trees in it

Of the latter were noticed "sam" (*Artocarpus chaplasha*), "poma" (*Cedrela toona*), "koroi" (*Albizzia odoratissima*), as the best.

Joom cultivation.

47. Joom cultivation had been carried on in the neighbourhood by the Garo for many years past, and its reservation has saved a valuable forest from destruction by this wasteful mode of cultivation, without, however, inflicting any hardship on these people.

Valuation surveys showing general size of trees.

48. The result of the valuation surveys made in this and other reserved forests, and exhibiting the general size of the trees, is shown in Appendix B.

Timber depôt.

49. A timber depôt for this and the other Kamrup reserves should be established on the Koolsee river, as near the crossing of the Assam trunk road as the nature of the river, *i.e.*, the depth of water, will permit; it should not be further away from the Brahmaputra than the boats engaged in the timber trade on the latter river will be able to ascend the Koolsee.

The working of the forest.

50. The forest is very favorably situated for the working out of its mature timber, as it immediately adjoins the Koolsee river, down which timber can be floated all the year round, and which has for many years past been used for exporting timber for the Dacca market and the stations of Gowhatty and Goalpara.

No villages included.

51. No villages or cultivated lands of any description are included in the reserve; neither has there been a necessity for granting any rights or privileges to any of the villagers in the neighbourhood, since there is ample forest produce to supply their wants outside of the reserve.

The Bordooar reserve.

52. The Bordooar reserve is situated in the Bordooar mouzah, and had only lately been given up by the Lower Assam Tea Company, which had large areas of sâl forests on the estate, and worked the most accessible ones in this reserve before throwing up the land. The most valuable of the sâl forests in this neighbourhood remains, however, in the possession of this Company.

53. Of this reserve also the greater portion is situated on low and detached hills north of the Khasi Hills, and on the right bank or east of the Koolsee river, which it adjoins for about 6½ miles.

Situation.

54. Its area is estimated at 23 square miles.

Area and boundaries.

The boundaries of this reserve are as follow :—

North.—A line along the foot of the hills skirting the paddy-fields of Niagaon, Tea Maripara, Aluha, and Chowtolla.

East.—Along the foot of the hills skirting the paddy lands of Borsola, Ghagoriachok, Gbernabaree, Panjamie, and Jopungbaree, up to a small feeder of the Moira nuddee; down this feeder to the main stream, and along the same and the Lower Assam Company's southern boundary up to the Batanuddee; thence along the path at foot of hills, skirting cultivation and village of Kamranga up to the Chucko-khal, and along it and path leading to Boluntpore.

South.—Along the ridge of the forest skirting the villages of Boluntpore Rajapora; then along path up to the Koolsee khal, and along the Koolsee khal to the Koolsee nuddee.

West.—The Koolsee nuddee.

55. The soil on the hills is the same as that in the Pantan reserve and in the southern portion of it, on the level ground; it consists of a still more sandy loam with a rich covering of vegetable mould on the surface.

Soil.

56. The forest in this reserve is somewhat unequally distributed over the whole area; and whilst the southern portion, the greater part of which is on level ground, contains perhaps the best sâl forest in Assam, the northern slopes of the northern hilly portion bears evident signs of former jooming, and the western slopes have, as stated before, been worked to some extent.

Condition of the forest.

57. This forest, having the Koolsee river on its western side and the Bata river near the eastern side, is well situated as regards water-carriage for the timber, both rivers being suited for floating timber, and about the best in the whole of south Kamrup.

The working of the forest.

58. In this reserve there are neither any villages nor cultivated lands included, nor has it been necessary to grant any rights or privileges to the villagers in the neighbourhood, as there is plenty of every description of forest produce available for them without going into the reserve.

No villages included.

59. The Matyekar reserve is situated on one of the outer northern spurs of the Khasi Hills, known as the Lemphi range, and was part of the disputed land claimed by the people of Jeerung as well as by the plains people of Kamrup, the latter having been encroaching gradually on the Khasi Hill territory, until the claims were investigatated and settled by the Deputy Commissioner of both districts inquiring into and going over the boundary themselves, which opportunity was taken advantage of by Mr. Aylmer to fix the boundaries of this reserve.

The Matyekar reserve.

60. Its area is estimated at 3½ square miles.

Area and boundaries.

The boundaries are as follow :—

West.—The Bata nuddee, which runs along the foot of hills, up to the village of Pookapanpara, and along the foot of the hills passing behind the Bordooars (Lower Assam Tea Company's) bungalow, and past the village of Nokaree up to a larger beel, which lies at the foot of Dumabulparbut.

North and North-East.—Up a small feeder which falls into this beel to top of Deemabeel, then down the Um Thoma to its junction with the Umsurn river.

South-East and South.—Along the foot of the hills in the valley of the Umsurn; passing the villages of Kenapara and Bandapara up to the Bata nuddee.

61. The surface soil of the Matyekar reserve is the same sandy loam as in the Pantan reserve, with granitoid rock, more or less decomposed, underneath which is the common formation of the north side of the Khasi Hills.

Soil.

Owing to the steep slopes of the hill the surface soil is liable to be washed away, which has to be guarded against in the working of it.

62. The forest in this reserve is excellent, well stocked with timber, and consits almost exclusively of sâl, but a good many of the first-class trees have been worked out in the shape of short logs and btoats or dug-outs.

Condition of forest.

The useful kinds of trees noticed besides sâl were "koroi" (*Albizizia odoratissima*), "pareflee" (*Bignonia chelonoides*), "bunam" (*Mangifera sylvatica*), "simul" (*Bombax Malabaricum*).

63. The line of export for the timber from this reserve is the Bata river, which is suited for floating nearly all the year round, and runs into the Koolsee river, on the banks of which the general depôt for the timber from all the reserves should, as stated before, be established, where the timber could either be sold or floated to the Brahmaputra, and down this river to the Dacca market.

The line of export for the timber.

64. No villages or revenue-paying cultivated lands or grants are included in this reserve, and all local wants of the villagers can be supplied from the forests left outside of the reserve.

No villages included.

65. Besides these forests in the Kamrup district, the Jeerung sâl forest in the Khasi Hills was also examined, as it had been ordered to be made a reserve, if it should prove sufficiently valuable. The whole of the Jeerung Ilaka had been leased in perpetuity by the Jeerung chief to Government, on the condition that the income from these lands should be equally divided between the Government and the Jeerung chief; but it is evident from the lease that cultivation (which means jooming in these hills) was rather to be encouraged instead of being prevented, which latter course would have to be adopted for that portion of the ilaka at least which was intended for a reserve. Moreover, with strict conservancy, the revenue from these forests might probably for some time to come be smaller than if the felling was allowed to go on unchecked by conservancy measures; so that the chief's income would be less than it might have been, and compensation in the shape of an annual payment making up for such loss or deficiency would probably be claimed by the chief.

The Jeerung forest.

66. On the other hand, there can be no doubt that this property of the Jeerung chief is rapidly decreasing in value, and that within a few years hence the income from these forests will be less than if it was now placed under conservancy rules. Mr. Aylmer did not consider the forest worth reserving on account of the jooming which was carried on in the forests by the people, whose property it was, and on account of the forest having much deteriorated within late years in consequence of uncontrolled felling, and the likelihood of compensation being demanded by the Jeerung chief if it became a reserve; but he recommended that jooming should be restricted to certain defined areas, and that the size of the trees to be felled should be fixed.

Decrease in value.

67. Since this examination of the Jeerung forests, however, the disputed boundary between Jeerung and Kamrup has been adjusted, and a considerable area of better forests has been added to the Jeerung Ilaka; and since the jooming is chiefly carried on in those portions of the hills which are further back from the plains than the most valuable of the sâl forest, the latter covering chiefly the northern slopes facing Kamrup, the Jeerung chief might be induced to agree to have it made a reserve and to a forest boundary within which jooming was prohibited. If it was properly explained to him that the forest must deteriorate if not better controlled than it is at present, and that, on the other hand, his income must eventually increase and be secured in perpetuity by such a measure, he would probably demand no compensation at all, in which case it would be very desirable to add this forest to the Kamrup reserves, which it immediately adjoins, and could be managed with the whole, making a very compact charge for an officer to look after.

Additions to the old Jeerung forest.

68. In addition to the Jeerung forests, those in the Dumurria, Panbarry, and Beltollah mouzahs were also examined by Mr. Aylmer, but are described as containing nothing but scrub, in consequence of perpetual jooming in these parts.

Open forests in Kamrup examined.

In the Ranee mouzah, the remains of what must have been at one time excellent sâl forest were also examined, but found to have almost entirely been destroyed by Garos, who settled in these tracts, leaving only the large stumps to show what there had been.

The small patches left here and there remain as open forests under the Deputy Commissioners on account of the cultivation all around and intervening, which prevented strict conservancy without risk of constant complication with the villagers.

69. A forester and five forest watchers have been appointed to watch over the Kamrup reserves, and to control the felling of the mature timber.

Conservancy establishment.

70. The demarcation of the boundaries has also been commenced, and is progressing favorably.

The demarcation of the reserves.

71. The most westerly reserve in the Nowgong district is the Kholahaut reserve in the Khola mouzah.

Nowgong reserves.

72. It is situated immediately at the foot of the northern slopes of the Jynteah Hills, on perfectly level ground, and adjoining the Trunk Road of Assam, for the bridges, on which alone the ensuring of a supply of sâl timber was highly desirable in this part of the country, where sâl approaches its eastern limit, and consequently is scarce and increases in value.

The Kholahaut reserve.

The eastern portion of the reserves had formerly been taken up for the purpose of tea cultivation, but was afterwards thrown up by the owner, and has now been resumed by Government.

73. Its area is estimated at 7½ square miles.

Area and boundaries.

The boundaries of the reserve are as follow:—

North.—The northern boundary of the grants Khola (No. 46) and Amjaric (No. 47) (both resumed by Government), up to the Khola mouzah eastern boundary line.

East.—Along Khola mouzah eastern boundary line, from the northern boundary of Amjarie grant (No. 47) to the foot of the Khasi Hills.

South.—The foot of the Khasi Hills and Kholahaut river up to the Nowgong and Gowhatty Trunk Road.

West.—Along the Trunk Road from Kholahaut river up to the northern boundary of the late Khala grant (46), now resumed by Government, at the 29th mile-stone.

Soil.

74. Like the greater portion of the plains of Assam, the soil here is an alluvial deposit—chiefly consisting of sand with a good surface soil of vegetable mould, formed by the decay of the vegetation on these lands.

Condition of the forests.

75. The trees in this reserve are almost exclusively sâl, of excellent growth, but no first or second class or trees above three feet in circumference are left in it; the whole having been felled and removed by the Department of Public Works for the bridges on the Trunk Road.

In the westerly portion of the reserve the trees are very scattered, and close to Kholahaut a small part of it is grass land, where the natural reproduction of sâl should be aided by sowing and planting.

The greater part of the timber from this forest will always be required by the Department of Public Works for bridges on the road, and for all there might be over and above these demands, there will be a ready sale in Gowhatty and lower down the Brahmaputra, where the timber can be floated to by the Demal, Kullung, and Brahmaputra rivers.

No villages included.

76. No villages or cultivated lands are included in this reserve, and the wants of the inhabitants are amply supplied from forest lands outside the reserve; nor has there been a necessity for granting any other privileges.

The Deboka reserve.

77. The next reserve proceeding eastward in the Nowgong district is the Deboka reserve, in the Jamoonamookh mouzah, which is also a sâl forest, and is situated at the foot of the south-eastern slopes of the Mikkir hills and between the latter and the Jamoona river.

Area and boundaries.

78. Its area is estimated at 3¼ square miles.

The boundaries of this reserve are as follow :—

North.—The foot of the Mikkir hills, from the southern boundary of the former Government reserve No. 229 up to the Gungadasee river.

East.—The Gungadasee river, from the foot of the Mikkir hills to its junction with the Dikbaroo river, and the Dikbaroo river from its junction with the Gungadasee to its junction with the Jamoona.

South.—The Jamoona river, from its junction with the Dikbaroo river to Mikkirgaon, the old survey line of the former Government reserve No. 229, from Mikkirgaon up to the Mikkir hills.

West.—Same as the northern boundary.

Soil.

79. The soil consists of alluvial and diluvial deposits in the neighbourhood of the Jamoona, Dikbaroo, and Gungadasee rivers, and is a ferruginous clay at the foot of the Mikkir hills.

Condition of the forest.

80. The forest in the north-western portion is chiefly sâl of very good growth, and has in former time supplied some of the best sâl timbers to the station of Nowgong, but has been worked excessively on this account, so that no first class trees of over 4' 6" are left in this forest for the present, and at least 15 to 20 years will have to elapse before a regular supply can be reckoned on again from this forest. It requires careful watching and great attention, as it is almost the only source of good timber for the supply of the station of Nowgong.

In the eastern and south-eastern portion the sâl is more mixed with other trees, which latter should be gradually removed to make room for the sâl; and on a portion of grass land towards the Jamoona, the natural reproduction of sâl is to be aided by sowing and planting, to get the whole area well covered with sâl only.

Line of export and timber market.

81. This reserve is well situated as regards water-carriage, the Jamoona being a large river well suited for floating all the year round, and the Dikbaroo and Gungadasee for the greater part of the rains.

82. As stated above, the whole of the timber from this forest will probably be always required for the use of the station of Nowgong; but any surplus of timber could very easily be floated down the Jamoona, Kopeelee, Kullung, and Brahmaputra to Gowhatty or any other timber market below the latter place.

No villages included.

83. No villages, revenue-paying lands, or grants, have been included in this reserve, and no rights or privileges existed, or had to be granted in it.

General management of sâl forests.

84. In the Government resolution on the annual forest report for 1871-72, the management of sâl forests has been specified as one of the chief questions to be solved by forest officers, and has been remarked upon in full detail in the memorandum on forest operations in Assam lately submitted to the Commissioner of Assam and needs therefore no further mentioning here.

85. The third forest reserve in Nowgong is a mixed evergreen forest, situated in the Mikkir hills, on the left or northern bank of the Kullianí river, a tributary of the Dhunsiri, which it joins about 10 miles from the Brahmaputra.

The Mikkir hills reserve.

Comparatively few years ago the whole of the Mikkir hills were covered with almost virgin forest, but joom cultivation has by this time destroyed nearly the whole of it, the present reserve being about the only good forest tract remaining, and has been reserved in the hope that, as the demands for timber in Assam increase, this tract will in a great measure supply the wants for the Nowgong district, where there is little or no forest left besides this and the two sâl reserves described above.

86. The area of the Mikkir hill reserve is estimated at 65 square miles.

Area and boundaries.

The boundaries are as follow :—

North.—The Lung Kung Tung, from its source to its junction with the Famoi Joorie ; the Famoi Joorie from its junction up to the ridge between the Lung Kung Tung and the Borpoong rivers ; then along this ridge to a feeder of the Borpoong, and this feeder from its source to its junction with the Borpoong ; along the Borpoong from this feeder to its source ; from the source of the Borpoong along the crest of the ridge between the Borpoong and Bor Deopani rivers ; from source of Borpoong up to a feeder of the Tarcepoong.

East.—The last-named feeder down to its junction with the Tareepoong, and then the Tareepoong to its junction with the Kalliani.

South.—The Kalliani river, from the junction of its feeder, the Tareepoong, to the junction of its feeder, the Manie Joorie.

West.—The Manie Joorie, from its junction with the Kalliani river to its source at Saringvok hill, then a boundary line from the source of the Manie Joorie to the source of the Lung Kung Tung.

87. The forest is a dense mixed evergreen forest, in which the following better kinds of trees prevail :—"Nahor," "gunserai," "jamoo," "hingoree," "hulluck," "sam," "parellee," "sutiana," "belloo," "amaree," "titasappa," "uriam," "hilika," "makai poma," "bunam," "kochon," "phoolsappa." Besides these a kind of "tezpat" (*cinamonum sp.*) is common, of which both the leaf and bark are used as spice in cookery.

Description of forest.

88. The only use these forests are at present is the supply of large trees for boats or dug-outs, there being no demand for the other kinds of timber, except sâl, in the general market of Bengal, and local requirements being for the present, as a rule, obtained by the people from their own estates.

Present use.

89. In the face of the loss on the timber operation on the Dhunsiri, Dching, and Debroo rivers, which will be shown under Section V, "Financial Results," it would not be advisable for the present to work these forests, until there is more certainty of higher prices being realized for this timber.

The working of the forest.

It would have to be dragged by elephants to the Kalliani, which is the southern boundary of the reserve, and reported as suited for floating timber.

90. There is a small village of nine houses at present in this reserve ; but as the Mikkirs change their villages about every two years, it will be no hardship to them if they are required to move out of the reserve, which they are certain to do of their own accord on being prohibited from any further clearing of the forest.

Mikkir village in the reserve.

91. The boundaries of the Nowgong reserves have been demarcated, and one forester and four forest watchers were placed in charge of them, to watch that no illegal felling of trees for boats, or jooming, is carried on.

Demarcation of boundary.

92. The maps of these reserves are now being prepared in the office of the Superintendent of Revenue Survey, Lower Circle.

Maps of the reserves.

93. In the Naga Hill and Seebsaugor districts, the "Nambur" forest has been selected as a forest reserve, which consist of the most northerly portion of a very large tract of forest land lying between the Seebsaugor and Nowgong districts to the north, and the foot of the Naga Hills to the south.

The "Nambur" forest reserve.

The Nambur forest reserve is situated on the banks of three large rivers,—the Doigurung, Dhunsiri, and Doyang, all of which are suited for floating timber.

All the wants of the Public Works Department in this part of the country, the station of Golaghat, and the requirements of private estates in the neighbourhood, which have no timber of their own left, are supplied from this reserve, as it is situated beyond the eastern limit of sâl, the better kinds of wood from the mixed evergreen forest, such as "poma" (*cedrela toona*), "ajhar" (*Sagerstræmia reginæ*), "nahor" (*Mesua ferrea*), "hulluck" (*Terminalia bicolorata*), have to be used instead of sâl for building and other purposes, and all the woods are more or less fit for tea-boxes, canoes, and the manufacture of charcoal.

Area and boundaries.

94. The area of the Nambur forest is estimated at 100 square miles.

The boundaries are as follow :—

North.—Along the whole course of the Turajan, from its mouth to its source, and from thence a straight line across to the "Doigurung."

South.—Along the whole course of the Bor Hilonijan, from its exit at the foot of the rengmah Hills to its junction with the Dhunsiri, and from thence along the road between Borpathar and Jamaguri.

East.—The Doyang, river from its junction with the Turajan up to the Jamaguri Ghât.

West.—The foot of the eastern slopes of the Rengmah Naga Hills, and the Doigurung river from its exit in those hills to the point where the northern boundary line cuts it.

Soil.

95. The soil consists of diluvial and alluvial deposits from the three large rivers on the banks of which it is situated, and there is a great accumulation of vegetable mould forming the surface soil.

Description of forest.

96. It has always, from the time that Assam was annexed, attracted the attention of the civil authorities by the superior growth of the trees, and been preserved in an unprofessional way almost ever since. Many of the largest trees have, however, been felled and removed in the immediate vicinity of the rivers for house posts and in the shape of canoes or dug-outs, but at some distance into the forest, away from the rivers, it is still well stocked.

Timber depôt and market.

97. The timber depôt for the Nambur forest reserve is at Gholaghât, about 8 miles below the junction of the Dhunsiri and Doyang rivers, and 40 miles' distance from the Brahmaputra.

There is no other market at present for the timber from the mixed evergreen forests than the local requirements of the district, which can more than adequately be supplied from this forest.

The line of export.

98. If at some future time sufficiently high prices can be realized for the timber from these forests to render its export advisable, more forest could be added; and there is excellent water-carriage from the forest down the Dhunsiri river to the Brahmaputra, and no forest in Assam is more favorably situated for the cheap transport of timber than this.

Improvement of the mixed evergreen forests not advisable.

99. The improvement of the mixed evergreen forests by sowing or planting is not advisable, since none of the kinds are equal to, or ever can be said to approach, teak or sâl in value, and any expenditure for this purpose would certainly be much better applied to the planting of teak or the protection of sâl, as explained in detail in a former report on the forest operations in Assam. There is no danger from fire in the mixed evergreen forests of Assam, and all that should be done is to ensure natural reproduction as far as possible by only felling mature trees, so as to ensure the shedding of seed before their removal and, as a matter of course, preventing jooming in them.

No villages included.

100. No villages or cultivated lands remain within the boundaries of this reserve; neither has there been any necessity for granting rights and privileges to the inhabitants of the neighbourhood, since grazing ground and forest produce are to be had everywhere in great abundance outside of the reserve.

Conservancy establishment.

101. A forest ranger and five forest watchers have been placed in charge of this forest for its general protection, to prevent illegal felling of timber, and to control the felling of trees by purchasers.

All reserves under the Forest Department.

102. All the forests above enumerated are "special reserves" in distinction from "open forests," and are under the entire control of the Forste Department.

Durrung reserves.

103. In the Durrung district on the north side of the Brahmaputra, and along the foot of the Bhootan and Aka Hills, three more reserves were selected, but were not sanctioned by Government for want of more detailed information regarding the settlement of this boundary and any privileges which the hill people had enjoyed hitherto, or the possibility of political complications resulting from the reserving of these forests.

SECTION III.—PLANTATIONS.

Koolsee teak plantation.

104. On the right bank of the Koolsee river, in south Kamrup, and about 36 miles west of Gowhatty, an experimental teak plantation was started in July 1872 by Mr. Aylmer.

105. The lateness of the season rendered it impossible to get more than 7½ acres under cultivation; and as none of the cut grass and scrub could be burnt in the height of the rains, and consequently had to be carried some distance, the experiment became more expensive than it would have been if started in the dry season.

106. The spot selected was a gentle incline from the foot of the southern slopes of the Andaree Hill towards the Koolsee river, with a rich sandy and very pliable loom of 6 to 10 feet in depth, and vegetable mould on the surface.

Locality.

The land is supposed to have been under cultivation some 12 years previous, and was at the time of clearing covered with high grass and scattered trees, such as "sâl," "koroi," "toon," "parellee," several species of figs, &c., and was almost entirely cleared previous to the planting.

107. The seed used was of different descriptions, viz., Burmah seed of 1870, which had been kept in the Forest Office since that year; Burmah seed of 1872; and seed gathered from the teak trees in Gowhatty in 1872. On about half an acre the seed was put out direct at the stakes 3 feet × 6 feet, and 5 seeds at each stake with seed of 1872 from Burmah.

The seed.

108. The rest of the seed was put down on the 7th of July in nursery beds 4 feet in width and occupying a space of about one-eighth of an acre, which had nearly all germinated by the 25th of the same month.

The Burmah seed of 1872 germinated quickest and most regularly, whilst that of 1870 took longer to germinate, but proved equally good, and the Gowhatty seed came up much thinner than either of the others.

109. With these seedlings the remaining 7 acres were planted out during the first half of September; they were on an average 3 inches in height with a top root of equal or greater length. They were carefully removed with as much soil on the roots as was practicable.

Transplants.

110. The plantation was got up with local labour, which is procurable to some extent in the Kamrup district.

Labour.

111. In April 1873 the plants on the half acre, where the seed was put out at stake 3 feet × 6 feet, with fresh Burmah seed, looked by far the best; whilst of the transplants there were some that were equal to those put out at stake; but many others had died down to the ground, which is the usual consequence of late transplanting. From the end of September to the end of March two men were left on the plantation to do the most necessary clearing, to keep out the fire, and fill in vacancies.

Seed put out at stakes.

112. An examination of the plants in April 1873 gave the following results :—

Inspection of plantation.

Where the seed was put out at stakes 3′ × 6′, area 0·86 acre—

Total number of planting spots examined	1,005	
Number of plants alive	972	
Number of failures	33	
Average height per plant	6½ inches.	
Percentage of plants alive	97	100
,, of failures	3	

Where transplanted at 6′ × 6′, area 6·62 acres—

Total number of planting spots examined	995	
Number of plants alive	925	
,, of failures	70	
Percentage of plants alive	93	100
,, of failures	7	

113. The expenditure up to the 31st of March on this plantation is shown below, which, as stated before, is exceptionally high on account of the experiment having been commenced so late in the season.

Expenditure.

Particulars.	Amount. Rs.	A.	P.
Collection and transport of seed	27	0	0
Cooly hire at plantation	315	0	0
Pay of plantation Moonshee	34	1	6
Ditto, peon	5	0	0
Ditto, chowkeydar	24	0	0
Clearing teak plantation for one month and 17 days	9	0	0
For sundries	1	0	0
Total	415	1	6

Makoom plantation.

114. The experimental teak plantation at Makoom has not received as much care and attention as the one at the Koolsee.

115. It is situated in south Luckimpore, on the right bank of the Deehing river, near the fort of Makoom, and about 100 miles up the Deehing river from its junction with the Brahmaputra, and 50 miles east of Debrooghur.

Locality.

116. This plantation was also started in the height of the rains, in July 1869, when one acre was brought under cultivation on an entirely cleared and high level ground within about quarter of a mile from the Deching river.

Commencement of experiments.

117. The greater portion of the ground was an old joom field, surrounded on all sides by very dense mixed evergreen forest, with a rich porous loam, to a depth of 10 to 15 feet, a stratum of gravel underneath, and very rich and deep vegetable mould on the surface.

118. Seed from Burmah was used and put out at stakes 6′ × 6′, with the exception of a small quantity, which was sown in a nursery bed to fill up the vacancies.

The seed.

119. The condition of this portion of the Makoom plantation is as follows :—

Condition of the plantation of 1869.

Total number of planting spots examined	...	1,210	
Number of plants alive	...	1,134	
,, of failures	...	76	
Percentage of plants alive	...	94	100
,, of failures	..	6	
Total number of trees measured ..	...	100	
,, girth at four feet from the ground	...	928·00	inches.
Average girth per tree	...	9·28	,,
,, height per tree	...	23·80	,,

The general appearance of the plants is healthy and vigorous. The plantation keeps itself clear of grass and weeds by the shade of its own trees, so that no more expenditure is required on this one acre.

120. In 1871 about 25 acres were cleared for an extension, but only about 2·85 acres were planted.

Condition of the extension of 1871.

The condition of this portion of the plantation is as follows :—

Total number of planting spots examined	...	3,450	
Number of plants alive	...	3,210	
Percentage of plants alive	...	93	100
,, of failures	...	7	
Total number of trees measured ...	...	50	
,, girth at two feet from the ground	...	142·00	inches.
Average girth per tree	...	2·84	,,
,, height per tree	...	5·82	,,

121. A further extension of about 1¾ acres was attempted in 1872; but on quarter of an acre, which was put out at stakes, no seed at all came up, and it is doubted by Mr. Forest that ever any seed was put down; and on the rest there are more than 50 per cent. vacancies; and the total area of the plantation having only increased by about half an acre, instead of 1¾ acre as reported, this work had better be left out of the account of the Makoom plantation altogether, and be done over again.

Condition of extension of 1872.

122. Several trees in this plantation were attacked by an insect, which made its way into the stem of the tree, at its roots, or a few inches above the ground, and worked up to the heart of the young tree, and thus eventually destroyed it.

Plants attacked by insects.

123. The total area of the Makoom plantation is about four acres. Local labor for the present is limited, and requires a careful manager to obtain it.

Area of Makoom plantation.

124. The total expenditure on these four acres has been up to the present Rs. 540-0-6, which, however, must not be taken as the cost of getting up plantation at Makoom, as this high expenditure is entirely owing to the want of proper management, since the cost of the one acre started in 1869 (exclusive of the watcher on Rs. 7 per mensem, who was kept at the plantation) came during the first 19 months, or up to the end of March 1871, only to Rs. 31-12-5, when it was already in a condition not to require any further expenditure on it, and this is the one acre which has up to the present exceeded in growth the Bamunpookree plantation at the foot of the Darjeeling hills, although the latter is a year older and was got up almost in the same way, except that at Makoom no other crop was sown with the teak.

Expenditure.

125. The general question of plantation, to which the attention of Forest officers was directed in the Government Resolution on last year's Forest Report, has been entered into and remarked upon in the fullest detail in a separate communication on forest operations in Assam, and needs, therefore, no further notice here.

General question of plantation.

Section IV.

Yield of forests.

126. The only forest produce in Assam with which the Forest Department up to the present has been directly connected is timber.

127. In the lower Assam sub-division a first experiment was made to work out sâl timber from the open forest of the Ranee Mouza in the Kamroop district, which, as far as it went, was successful, inasmuch as 50 sâl logs, comprising 780 cubic feet, were brought to Gowhatty at the rate of annas 8-10 and sold very readily at annas 15-2 for the cubic foot.

Lower Assam timber work.

128. One hundred more trees had, however, been marked for the same contractor, who agreed in March 1872 to bring these 150 trees by the 31st July 1872 to Gowhatty, in which he completely failed.

129. In 1873 he was called upon to explain the delay, when illness, low water in the bheels and rivers, and low rate of pay for the work, were alleged as having prevented him from fulfilling the contract; the real reason, however, being that he was ignorant of timber work, and had no elephant, neither made any effort to hire one for the purpose of dragging out the timber, but endeavoured to do so by men, and consequently found it not paying, which brought on delays, and made him fail eventually altogether.

130. The dragging by elephant was shown and explained to him by Mr. Aylmer; and as the Department had no elephants available for timber work, another two months, up to the end of May, were granted to him to fulfil his contract, in which, however, he has failed also, and the elephants of the Department have now been put to dragging the timber into the water.

131. No successful timber operations, especially not the fetching out of long logs, is possible without the employment of good elephants, which is the first necessity in work of this kind; and in a country like Assam, where manual labour is comparatively scarce, it is an indispensable item, and the gap to be filled in to attain any satisfactory results of timber work.

Elephants required for timber work.

132. It is true traders are working timber out of these forests by manual labour, but all in short pieces of 10 feet or little more in length, and under peculiar arrangements amongst each other, which cannot be adopted by the Department.

133. The existing timber trade, although small, should be taken advantage of and developed, since the royalty accrueing to Government is about equal to that on timber worked out by Government agency, but the Department should at the same time endeavour to work out long and superior timber.

Existing timber trade.

134. The sâl forests in Kamroop are estimated to be able to yield about 1,200 trees annually, for which there will be a ready sale in the Goalpara, Bogreebaree, Dacca, and other markets down the Brahmaputra, besides the local requirements of Gowhatty, which may be estimated at present at about 100 trees annually. The Nowgong sâl forests, have no mature timber in them at present, and the Baleepara (Durrung) sâl forest has not more than will be required for local wants.

Estimated yield of Kamroop sâl forests.

135. It is intended, as stated before, to have a general depôt for periodical sales of the timber from the Kamroop reserves on the Koolsee river as near the crossing of the Assam Trunk Road as the depth of the water in the cold season will allow the timber boats used for the floating of sâl down the Brahmaputra will permit, and a station depôt at Gowhatty and Tezpore, to meet the requirements of these towns.

Timber depôt.

136. The information which has yet to be collected for a working plan of the Kamroop forests, and the outlines of a system according to which the working of these forests might be carried on, were noticed in the memorandum on forest operations in Assam, which renders it unnecessary to enter again into further details here.

The working of the sâl forest.

137. No fresh timber operations were undertaken in the Upper Assam sub-division.

Timber operations in Upper Assam.

There were at the beginning of the financial year 1872-73 the following timbers in hand :—

At the Debrooghur depôt ...	...	78 logs.
„ Deching „ ...	...	246 „
Total	...	324

To these were added during the year those felled formerly, but which had remained in the forest :—

At the Deching depôt ...	...	2 logs.
„ Golaghat „ ...	...	143 „
Total	...	145

This makes the total at the different depôts in the Upper Assam sub-division as follows:—

At the Debrooghur depôt ...	...	78 logs.
„ Deeping „ ...	...	248 „
„ Golaghat „ ...	...	143 „
Total	...	469

Of these, 428 logs were sold, leaving only 41 remaining of the timber from the Debrooghur depôt.

138. These 41 logs would also have been sold before the end of the financial year but for their having got partly buried in the sand of the river before the sale took place, and no bid being made for them at the time of sale.

The Executive Engineer has since then offered to have the timber dragged out from the river-bed, and to pay an aggregate sum of Rs. 28 for the same, which offer has been accepted, as there was no likelihood of a better one being made, and the river was rising at the time.

139. The timber having been left in the river-bed, was owing to the only available elephant having injured one of her legs by the dragging, and Mr. Forrest failing to hire another one instead.

No demand for the timber from the mixed evergreen forests.

140. All forests in the Upper Assam sub-division are mixed evergreen forests, for the timber from which there is at present no demand beyond the local requirements of the district, which is very trifling, since much is still procured by the inhabitants from their own estates.

Loss on timber operations.

141. There has been a considerable loss on the timber brought to depôts from these forests, as will be shown under financial results, since it deteriorates by exposure to the weather in the depôts, and when put up to auction, to avoid the latter and consequent loss, the prices offered do not cover the expenses of bringing the timber into the depôt, there being hardly any purchasers, and the latter knowing full well that the timber must be sold, and that any offer will be accepted, rather than keeping it longer in the depôt or incuring further expenses on the removal of such timber.

142. It would not be advisable on any account to carry on more timber operations in these forests until there is a certainty of being able to export it at higher rates than these woods fetch at present, and the trifling quantities which are required for local purposes had much better be brought out of the forests by the purchasers themselves, under the necessary restriction to prevent damage to the forest generally.

Classification of Assam timber trees.

143. The Assam timber trees are divided into three classes, and charged for as shown in Appendix C.

144. The caoutchouc and the soom trees have not as yet been declared reserved trees.

145. The production of caoutchouc and silk in the Assam forests is under the control of the civil authorities.

Section V.—Financial.

146. There is little to be said in this section, since, with the exception of 50 sâl logs worked out of the Kamroop open forests, and 145 logs from the upper Assam mixed evergreen forests, no reproductive works were carried on, and the sale of the timber from the mixed evergreen forests in Upper Assam has resulted in a loss to the Department.

Financial results of the working of the Kamroop sâl forests.

147. Including the auctioneer's fee, the cost of bringing the sâl timber from the Kamroop open forest to Gowhatty was Rs. 6-3-10 per log, or annas 6-4 per cubic foot, which shows a net profit of Rs. 8-9-7 per log, or annas 8-10 per cubic foot.

Financial results of the working of the Upper Assam mixed evergreen forests.

148. Only the best kinds of timber fit for building and other purposes were brought from the mixed evergreen forests into the depôts of Upper Assam, but in the absence of demand for timber only very low prices were offered at the sale, which had to be accepted, as the keeping of the timber would only have necessitated more outlay for depôt watchers, and deteriorated at the same time, without any hope for realizing higher prices hereafter.

149. The cost of the timber to the Department was higher than the prices realized, and was for the whole experiment as follows:—

Expenditure—

	Rs.	A.	P.
In 1870-71	1,083	1	0
„ 1871-72	4,493	14	0
„ 1872-73	195	2	4
	5,772	1	4

	Rs.	A	P.
RECEIPTS—			
In 1871-72	1,317	3	3
„ 1872-73	1,219	14	0
	2,537	1	3
ADD—			
Value of timber in hand	28	0	0
Advances outstanding	367	15	8
	2,933	0	11

This shows a loss of Rs. 2,839-0 5 on the experiment in the three depôts as follows:—

	Rs.	A.	P.
AT THE DEBROO DEPOT—			
Expenditure	723	10	4
RECEIPTS—			
By timber sale	39	10	0
Value of timber in hand	28	0	0
Outstanding advances...	367	15	8
	435	9	8
Loss ...	288	0	8
AT THE DEEHING DEPOT—			
Expenditure	1,934	15	10
Receipts	500	0	0
Loss ...	1,434	15	10
AT THE GOLAGHAT (DHUNSIRI) DEPOT—			
Expenditure	3,113	7	2
Receipts	1,997	7	3
Loss ...	1,115	15	11

150. Of the timber in hand at the beginning of the year—

283 logs were sold at	535	9	6
41 logs in hand are valued at	28	0	0
Total ...	563	9	6

Boats sold.

151. Two boats, which had been used during the first inspection of the Upper Assam forests, and had been purchased in June 1869 for an aggregate sum of Rs. 332-8 were sold for Rs. 121-4.

Revenue from open forests.

152. All revenue from the open forests and on caoutchouc and silk-producing forests, is collected by the civil authorities

SECTION VI.—GENERAL REMARKS.

Progress in forest conservancy.

153. Forest administration in Assam may be said to have advanced a step during the year, inasmuch as in all Lower Assam those forests to which the department is to devote its time and attention have been defined and reduced to such dimensions which are not beyond what the department can manage properly and in which it can ensure progress.

Sâl reserves.

154. Those of the reserve forests placed under the Forest Department which are sâl, moreover, contain a fair proportion of mature timber sufficiently accessible to be worked profitably.

Mixed evergreen forest reserves.

155. Those mixed evergreen forests which have been reserved will probably yield enough to pay for their conservancy at present, and become more valuable hereafter, when all the local requirements will have to be supplied from them.

The caoutchouc trees

156. The closing of the caoutchouc leases has proved no safeguard for these valuable trees in the Government forests, neither has it prevented adventurers from procuring the caoutchouc from the hills beyond British territory, since thousands of maunds have been exported. It is impracticable

to protect the trees, since they are so scattered in the dense evergreen forests, extending over several thousand square miles, that control is impossible, unless the collecting of caoutchouc is made a Government monopoly.

157. Without the latter, it would be better to make it free to every one to collect rubber than to risk endless litigation to no purpose, or to making rules for the control without enforcing them.

158. In the latter case, if it is intended at all to produce caoutchouc in the Indian forests, plantations should be started at once, to come into bearing as the existing trees get destroyed.

159. If the collecting of the caoutchouc was made a monopoly, the income from this source would provide ample funds for caoutchouc plantations to ensure its permanent production, as it is at present, or even in much larger quantities.

The soom forests.

160. The soom forests could be improved by bestowing more care on the trees, and by removing them when they get too old for the rearing of the silkworms, so as to make room for the young trees to produce better leaves, which, together with an importation of larger quantities of cocoons from Lower Assam to Upper Assam, would stimulate the cultivation of silk.

Teak plantations.

161. The cost of teak plantations on a large scale might thus be defrayed by the receipts from the existing forest without an actual deficit on the working of the department, and such progress be made in the production of superior forests as the excellent and extensive waste lands, the waterways for the removal of timber, and the rich soil in Assam, make desirable.

Fire in the sâl forests.

162. No systematic protection of the sâl forests against fire was attempted, but an effort to do so in a portion at least will be made next cold season.

The conservancy establishment in charge of these forests has, however, lessened the indifference of the villages in the neighbourhood, and induced them to prevent the spreading of the fires from their fields.

APPENDIX B.

Statement showing the result of valuation surveys made in the Assam Forest Reserves.

Name of Forest Reserves.	Estimated area of reserves in square miles.	Area surveyed in square acres.	Total number of trees of the three first class on 100 acres.				Kinds of trees counted.
			1st class, 6 feet in circumference and more.	2nd class, 4½ to 6 feet in circumference.	3rd class, 3 to 4½ feet in circumference.	Total.	
Malyekar sâl forest	3½	42·5	217	819	2,642	3,768	Sâl trees only.
Bordooar sâl forest	23	13·3	413	451	5,008	5,864	Ditto
Pantan sâl forest	12	64·9	382	548	2,692	3,622	Ditto
Kholahaut sâl forest...	7½	17·2	.....	.....	755	755	Ditto
Deboka sâl forest...	3½	13·8	.....	28	797	825	Ditto
Mikkir Hills mixed evergreen forest ...	65	37·4	754	.....	.....	754	All useful timber trees.
Nambur mixed evergreen forest ...	100	30·9	220	576	1,265	2,061	Ditto

APPENDIX C.

Classification of trees for payment of revenue in Assam.

First Class.

Minimum girth for felling 5 feet; measured 5 feet from the ground.

No.	Native names.	Botanical names.	Royalty.
1	Sâl	Shorea robusta	Sâl, Rs. 8; all the rest, Rs. 6 per tree.
2	Sisu	Dalbergia sissoo	
3	Nahor	Mesua ferrea	
4	Ajhar	Lagerstrœmia reginæ	
5	Sam	Artocarpus chaplasha	
6	Poma	Cedrela toona	
7	Titta sappa	Michelia champacca	
8	Gunserai	Camphora glandulifera	
9	Ooriam	Bischofia Javanica	
10	Makai	Dipterocarpus Sp.	
11	Koroi	Albezzia odoratissima	
12	Boga Poma	Chikrassia tabularis	
13	Hulluck	Terminalia paniculata	

Second Class.

Minimum girth for felling 4 feet 2 inches; measured 5 feet from the ground.

14	Bur Jamoo	Eugenia mangifolia	At Rs. 3 per tree.
15	Ditto	„ jambolana	
16	Gomaree	Gmelina arborea	
17	Bheh	Salix tetrasperma	
18	Bola	Marlea Sp.	
19	Makreeah or nagabey	Gordonia integrifolia	
20	Kair	Acacia catechu	
21	Phool sappa	Michelia oblonga	
22	Phoolhingoree	Echinocarpus tiliaceus	
23	Burhingoree	Castanopsis tribuloides	
24	Hilikha	Terminalia citrina	
25	Amaree	„ tomentosa	
26	Sonaloo	Cassia fistula	
27	Juteeli	Liquidambur altingia	
28	Moj	Juga bigemina	
29	Paroli	Bignonia chelonoides	

Third Class.

Minimum girth for felling 4 feet; measured 5 feet from the ground.

30	Roghoo	Nanclea cadamba	Free.
31	Gohora	Vitex pubescens	
32	Hollong	Dipterocarpus Sp.	
33	Booal	Ehretia serrata	
34	Borthekra	Garcinia pedunculata	
35	Bun am	Mangifera Sylvatica	
36	Ghoree am	„ Indica	
37	Simool	Bombax malabaricum	

Form No. 21.

FOREST DEPARTMENT, BENGAL—ASSAM DIVISION.

Annual summary of Revenue and Expenditure in the Assam Division during the year 1872-73.

Classification.	Sanctioned amount.	Amount recovered and disbursed.	Balance to collect and available.	Recovered and disbursed in excess of sanction.
	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.
Receipts.				
I.—Sale of timber brought to depôt by Government agency ...	.....	1,787 8 0	.....	1,787 8 0
IV.—Permit fees, rent from squatters, and collections on account leases	37,500 0 0	.....	.....	.....
VIII.—Fines and forfeitures	50 0 0	35 2 8	.....	.....
IX.—Miscellaneous receipts	50 0 0	416 4 0	.....	366 4 0
Total of receipts ...	37,600 0 0	2,238 12 8	.....	2,153 10 0
Expenditure.				
A.—*Conservancy and working.*				
I.—Timber expenses	17,000 0 0	232 3 11	941 0 2	.....
II.—Purchase of elephants and cattle	.....	2,629 15 3	.....	2,629 15 3
III.—Feed and keep of cattle	1,800 0 0	1,698 9 1	4 0 0	.....
VI.—Plantations	400 0 0	1,406 0 4	23 0 0	1,029 0 4
VII.—Forest work, cutting of creepers, protection of forest against fire, and other minor works for the conservancy and improvement of the forest, &c.	300 0 0	1,370 10 2	.....	1,070 10 2
VII.—Forest survey—topographical; and valuation to ascertain the contents of forests and annual rate of timber production	1,600 0 0	440 15 10	.....	.....
X.—Communications and buildings, and minor works, &c. ...	800 0 0	57 13 8	.....	.....
Total of conservancy and working ...	16,400 0 0	7,836 4 8	968 0 2	4,729 9 9
B.—*Establishments.*				
I.—Salaries—				
2. Executive officers	8,900 0 0	6,606 7 2	2,000 0 0	.....
(*b*) Execution	1,836 0 0	1,127 12 5	.....	.....
4. Forest conservancy establishment	3,132 0 0	1,263 9 8	.....	.....
5. Timber, timber depôts, and work establishment ...	.....	189 9 8	.....	189 9 8
II.—Travelling allowances—				
2. Executive officer	2,000 0 0	1,781 0 0	.....	.....
3. Subordinate establishment	300 0 0	115 7 9	.....	.....
III.—Contingencies—				
1. Stationery	20 0 0	2 5 0	.....	.....
2. Office rent; carriage of tents, records, &c.	900 0 0	609 5 0	.....	.....
4. Sundries	250 0 0	188 12 3	8 6 0	.....
5. Postage	120 0 0	104 1 0	.....	.....
Total of establishments ...	17,358 0 0	11,988 5 11	2,008 6 0	189 9 8
Grand Total .	33,758 0 0	19,824 10 2	2,976 6 2	4,919 3 5

Gowhatty,
The 10*th May* 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

FOREST DEPARTMENT, BENGAL.

Annual Abstract Account of cash transactions of the Assam Division for the year 1872-73.

Dr. Cr.

To cash in hand—	Rs.	A.	P.	Rs.	A.	P.	By expenditure of the Department—	Rs.	A.	P.	Rs.	A.	P.
1st April 1872	2,099	12	9	2,099	12	9	A.—Conservancy and working	7,836	4	3			
To revenue received during the year ...	1,890	10	0	1,890	10	0	B.—Establishment	11,988	5	11	19,824	10	2
To Income Tax deducted from salaries ...	71	10	0	71	10	0	By Remittances to Public Treasuries ...	2,793	9	0	2,793	9	0
To remittances from Public Treasury ...	19,326	6	6	19,326	6	6	By advances made	6,487	6	6	6,487	6	6
To deposits received (Mr. Mann's subscription to United Service Family Pension Fund)	44	2	0	44	2	0	By cash in hand on 31st March 1873 ...	695	2	7	695	2	7
To advances recovered	6,368	3	0	6,368	3	0	By value of timber made over to Public Works Department by transfer ...	345	0	0	345	0	0
To value of timber made over to Public Works Department by transfer ...	345	0	0	345	0	0							
Total ...				30,145	12	3	Total ...				30,145	12	3

Gowhatty,
The 10*th May* 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

FOREST DEPARTMENT, BENGAL.

Assam Division.

Annual Statement of Outstandings and Liabilities of the Department on account of Contractors and Disbursers for 1872-73.

Names.	Department Debtor.		Department Creditor.			Balances due.
	Recoveries in cash and value of supplies, and work done during year.	At close of year.	At commencement of year.	Payments made during year.	At close of year.	To Department (outstanding).
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1 Lazoo Mea	.....	.....	4 0 0	.....	4 0 0	4 0 0
2 Mahouts and Grasscuts	.....	.....	2 0 0	.....	2 0 0	2 0 0
5 Ram Chundor	7 7 0	7 7 0	54 9 4	.....	54 9 4	47 2 4
6 Omed Ram	.....	.....	41 0 0	.....	41 0 0	41 0 0
7 Jogo Mohun Sen	.....	.....	279 13 4	.. ..	279 13 4	279 13 4
8 A. C. Mookerjee	67 5 0	67 5 0	.....	105 5 6	105 5 6	38 0 6
9 Gobind Ram Das	.....	.....	.....	535 0 0	535 0 0	535 0 0
10 Mr. E. Forrest	2,737 10 11	2,737 10 11	.....	3,737 10 11	3,737 10 11	1,000 0 0
11 Bessruth Ally	76 0 0	76 0 0	.....	99 0 0	99 0 0	23 0 0
12 Vienna Exhibition	.....	.....	.....	6 6 0	6 6 0	6 6 0
13 Mr. A. P. Aylmer	671 1 9	671 1 9	.....	1,671 1 9	1,671 1 9	1,000 0 0

Gowhatty,
The 10*th May* 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

Form No. 24.

Assam Division.

Statement of timber brought to depôts from the different forest divisions, during 1872-73.

Name of river or division.	Forest.	Description of timber.	Pieces.	Cubic feet.	Total of each river.	
					Pieces.	Cubic feet.
Deehing	Telpani	Poma	1	20'	.....	.....
Ditto	Ditto	Uriam	1	9'	2	29'
Dhunsiri...	Nambur	Nahor	70	1,189'	.....	.....
Ditto	Ditto	Ajhar	19	263'	.. .	.....
Ditto	Doyang	Hulluck	47	952'	.....	.....
Ditto	Ditto	Poma	5	86'	... ..	.....
Ditto	Ditto	Moaj	2	31'	143	2,521
Unreserved Rance forests ...	Pamohee	Sál	50	780'	50	780'
		Total ...	195	3,330'	195	3,330'

Gowhatty,
The 10*th May* 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

APPENDIX A.

Statement of Population, area of Cultivated lands, Forest lands, and Soom forests in Assam.

Classification.	Kamroop.	Nowgong.	Durrung.	Seebsaugor.	Luckimpore.	Khasi and Jynteah Hills.	Naga Hills (approximate number).	Total.
1. Population	Square miles. 561,681	Square miles. 256,390	Square miles. 236,009	Square miles. 296,589	Square miles. 121,267	Square miles. 141,838	Square miles. 68,918	Square miles. 1,682,692
2. Area of the district in square miles	3,651	3,648	3,413	2,413	3,145	6,157	4,900	27,307
3. Total area cultivated	770	363·35	323	422·24	137·38	50	200	2255·97
4. Total area of the waste lands without forest on it	Unknown.	1545·09	Unknown.	1196·31	26·34	Unknown.	30	2797·74
5. Total forest area in the district	"	455·98	"	869·95	990·25	"	4,670	6986·18
	Bighas K. L.	Bighas K. L.	Bighas K. L.	Bighas K. L.				Bighas K. L.
6. Approximate area covered with Soom forest	5,177 2 11	606 0 0	1,695 0 0	49,500 0 0	Unknown.	None.	None.	56,978 2 11
7. Area of Soom forests used for silk cultivation in 1872-73	...	606 0 0	1,095 0 0	11,748 0 0	"	"	"	13,449 0 0

FORM No. 25.

Annual timber account for 1872-73 *in the Assam Division.*

Particulars.	Pieces.	Total.	Particulars.	Pieces.	Total.
I.—Stock in hand at the following Depôts at the commencement of the year—			I.—Timber removed by purchasers from Depôts—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	478	478
1. At Station Depôts, Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	324	324			
2. At Forest Depôts—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	.....	.....	II.—Timber lost and used by the Department—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	.....	.....
II.—Timber received at Depôts from the Forests—					
1. At Station Depôts—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	195	195	III.—Stock in hand at close of the year—1 at Station Depôts—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	41	41
2. At Forest Depôts—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)		....	2. At Forest Depôts—Logs, beams, sleepers, planks, and scantlings (Kala Khumbas)	.....	.....
Total	.....	519	Total	.....	519

Note.—Here explain the circumstances under which the timber was lost or used by the Department.

Nil.

Gowhatty, *the* 10*th May* 1873.

GUSTAV MANN,

Assistant Conservator of Forests, Assam Division.

FORM No. 26.

Statement showing the amount realized on account of the different classes of timber sold during 1872-73, *in the Assam Division.*

Divisions.	Number of logs and pieces sold.	Cubical contents of logs.	Amount realized and due on account of timber sold.	Average amount per log.	Average cubical contents of logs.	Average amount per 100 cubic feet.	Remarks.
			Rs. As. P.	Rs. As. P.		Rs. As. P.	
Lower Assam sub-division ...	50	780′	742 8 0	14 13 5	15′7″	95 3 0	
Upper Assam, sub-division Dhunsiri...	143	2523′3″	505 4 0	3 8 6	17′7″	20 0 4	
Ditto	5	.....	175 0 0	35 0 0	.....	.....	Canoes or dugouts which were made by the Department used for floating timber and afterwards sold.
Deehing	248	4546′4″	500 0 0	2 0 3	18′3″	10 15 11	
Debroo	37	Unknown	39 10 0	1 1 1	Unknown	Unknown	
Total ...			1,962 6 0				
Deduct—							
Amount due, but not realized during the year ...			.....				
Balance ...			1,962 6 0				
Add—							
Amount realized on account of former years... ...			.....				
Total shown as revenue on account of timber sales...			1,962 6 0				

Gowhatty,
The 10th May 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

FORM No. 27.

Statement showing the description of work done, quantity of timber removed, and amount paid during 1872-73 *in the Assam division for* 1872-73.

Logs.			Beams and sleepers.			Planks and scantlings.			Total.
Description of work.	No.	Amount.	Description of work.	No.	Amount.	Description of work.	No.	Amount.	
Carting			Carting ...			Saving ..			
Removing			Removing ...			Removing ...			
Floating	195	232 3 11	Floating ...			Stocking ...			
Dragging out of river beds... ...			Restocking ...		Nil.			Nil.	232 3 11
			Recovering ..						
Total ...	195	232 3 11							232 3 11

Gowhatty,
The 10th May 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

REVISED FORM No. 28.

Annual account of Forest Revenue, Assam Division, during the year* 1872-73.

Receipts.	Amount.	Disbursements.	Amount.
	Rs. As. P.		Rs. As. P.
Amount of revenue realized in 1872-73 ...	2,185 14 8	Amount disbursed in 1872-73	19,824 10 2
DEDUCT—		DEDUCT—	
Amount realized on account of previous periods	.....	Amount disbursed on account of transactions of former periods	.....
Balance .	7,185 14 8	Balance ..	19,824 10 2
ADD—		ADD—	
Outstanding on account of the year minus for bad debts	... ..	Amount due for transactions during the year under review but not yet disbursed ...	.....
Value of year's transactions ...	2,185 14 8	Real cost of year's transactions ..	19,824 10 2

		Rs.	A.	P.
Value of the year's transactions		2,185	14	8
Cost of year's transactions		19,824	10	2
Balance ...		17,638	11	6
Add (or deduct) difference between the value of stock at the commencement and close of the year		4,214	5	0
Net results of the year ...	Rs.	21,853	0	6

N.B.—If at the close of the year the value of stock should be in excess of what it was at the beginning of the year, the sale value of the excess should be added to the net results less such percentage on account of loss and deterioration as past experience has shown to be usual. Should, however, there be a difference at the close of the year, a deduction should be made, not of the price at which the stock was sold, but the sum (more or less) that it would take to replace it.

* Exclusive of revenue realized by civil officers.

GOWHATTY,
The 10*th May* 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

Detail of difference between Assets and Liabilities at commencement and close of the year.

	At commencement of the year.	At close of the year.	Difference. In favor of the year.	Difference. Against the year.
	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As P.
Value of timber	*4,642 5 0	†28 0 0	.....	4,614 5 0
Value of elephant	.....	.....	400 0 0	.....
Total assets ...	.....	.....	400 0 0	. ...
Deduct difference ...	.....	... ..	.....	4,614 5 0
Balance ...	.....	.....	400 0 0	4,614 5 0

* Rs. 4,642-5 is the estimated value of 324 logs at Rs. 14-5-3, which were in hand at the close of the year 1871-72.

† Rs. 28 is the estimated value of 41 logs in the Debroo depôt.

Statement showing the quantity of timber felled and brought to depôts during the year 1872-73 *in the Assam Division.*

Names of sub-divisions.	To station depôts. Logs.
Upper Assam	145
Lower Assam	50
Total ...	195

GOWHATTY,
The 10*th May* 1873.

GUSTAV MANN,
Assistant Conservator of Forests, Assam Division.

AREA OF RESERVED FORESTS.

ASSAM DIVISION.

Reserved Forests.	Added during the year.	Total remaining in 1872-73.
Kamroop District.		
Matyekar Reserve (sâl forest)	3½ square miles ...	3½ square mile.
Bordooar Reserve (ditto)	23 ditto ...	23 ditto.
Pantan Reserve (ditto)	12 ditto ...	12 ditto.
Nowgong District.		
Kholahaut Reserve (sâl forest)	7½ ditto ...	7½ ditto.
Deboka Reserve (ditto)...	3¼ ditto ...	3¼ ditto.
Mikkir Hill Reserve (mixed evergreen)	65 ditto ...	65 ditto.
Seebsaugor and Naga Hills District.		
Nambur Reserve (mixed evergreen forest)	100 ditto ...	100 ditto.
Total ...	214¼ square miles.	214¼ square miles.

GOWHATTY,
The 10th May 1873.

GUSTAV MANN,
Asst. Conservator of Forests, Assam Division.

AREA OF UNRESERVED FORESTS.

ASSAM DIVISION.

Area in 1871-72, about	4,000	Square miles.
Excluded or transferred to other heads	214¼	ditto
Total remaining in 1872-73	3,785¾	ditto

GOWHATTY,
The 10th May 1873.

GUSTAV MANN,
Asst. Conservator of Forests, Assam Division.

AREA OF FOREST TRACTS PROTECTED FROM FIRE IN THE ASSAM DIVISION.

No attempt of protecting any forests from fire has been made in Assam up to the present.

GOWHATTY,
The 10th May 1873.

GUSTAV MANN,
Asst. Conservator of Forests, Assam Division.

PROSECUTION FOR BREACHES OF THE FOREST RULES IN THE ASSAM DIVISION.

The forest rules have not yet been extended to the province of Assam.

GOWHATTY,
The 10th May 1873.

GUSTAV MANN,
Asst. Conservator of Forests, Assam Division.

AREA OF PLANTATIONS.

ASSAM DIVISION.

Plantations.	Area in 1871-72.	Total cost to end of 1870-71.	Area added during 1872-73.	Amount expended during 1872-73.	Total area up to 1872-73.	Total expenditure incurred up to 1872-73.
	Acres.		Acres.	Rs. A. P.	Acres.	Rs. As. P.
Luckimpore District. Makoom plantation on the Deehing River.	4	353	.....	187 0 6	4	540 0 6
Kamroop District. Koolsee plantation on the Koolsee River.	.....	.....	748	415 1 6	7·48	415 1 6
Total ...	.....	353	.....	602 2 0	.....	955 2 0

GOWHATTY,
The 10th May 1873.

GUSTAV MANN,
Asst. Conservator of Forests, Assam Division.

Report on the Forests in the Jynteah Hills.

1. Inspection of the forests in the Jynteah Hills commenced in the country about the Lubah river (to the south-east of the district), and was carried on as well as is practicable in the height of the rains (*i. e.* in August and September) from there to the Panch Poonjie Haka, to the west, and ended with the jungles to the north, north-east and north-west of the Jowai district.

2. The Lubah is a large river and well fitted for timber floating, but the jungles along the slopes of it are hardly worth mentioning, there being scarcely anything left in the shape of a valuable timber tree, in places easy to get at.

All the gentle slopes have been, and are year by year being joomed by the inhabitants of the several Poonjies in the neighbourhood, and now the only places where trees of good kinds are to be found are steep rocky spurs and valleys where the soil does not admit of the tree attaining any size. What few trees there may be are taken out by the villagers for their boats.

3. Jungles containing large and good kinds of trees are said to be found on the hills bordering the Simleng (the Lubah nearer its source), but the stream is very shallow and, judging from what the river below Sitting Bazar is, quite unfit for floating logs. It appears that felling, at any rate, for the purpose of trade has not taken place in these parts, this goes far to prove that getting out timber might not be a profitable undertaking, as after reaching Sitting Bazar, a few hours would be sufficient to get it into the Surmah and then to a market.

The Aphagong, joining the Lubah a little above Mulagul Bazar is only fit for floating, that is from any distance, after a flood; that there is good timber found in the Apha valley is evident, from the fact, that lately several logs were found on their way down to the Surmah from it. As there are but one or two Poonjies, and the valley is comparatively easily got at, forest conservancy could be started and carried on in it with less trouble then in many other parts.

4. The valley of the Noongong (flowing from the Sonaraga range into the Lubah) used once to contain very good timber, but now owing to Bengalis having been in the habit of cutting trees, more especially for door-posts and such like purposes requiring jungle timber, there is no valuable jungle left anywhere near the foot of the hills; good sorts of timber are, however, still procurable some distance (say a day's journey) up towards the top of the range, but as it must be rather far from where the Noongong becomes fit for floating, these small patches of jungle are of but little value. All the lowest hills which formerly must have contained really valuable timber, and which it would have been well worth while then to conserve are now under joom; the spurs too running down southwards are also cultivated periodically. Towards the west to the Mantidu river there are patches of thick forest, but it is chiefly high up on the main range, and consequently hard to get at, and though the Larun and Rampulung streams (flowing into the Noongong), are at times fit for floating, as they approach the plains, it would be a great and anything but remunerative undertaking to get large sized logs down from such a distance. To the west of Larung there are the Horoi and Hingarea streams, but all the slopes about them that are not too precipitous or rocky are joomed by the inhabitants of Mikur, Umpiang, Titang, Nichinpoor, and Jumoiu Poonjees, and the little jungle that may after a few years' rest spring up, is constantly being cut down to supply door-posts, &c., and fuel for the Bustees along the foot of the hills.

5. Before bringing the remarks on this portion of the district to a close it may as well be mentioned that now the police who were stationed (it is believed on the Noongong) have been removed. The Bengalees have again taken to cutting wood within the Jynteah hill boundary, and taking it out by the Noongong, as these people are not very particular about the kind or size of wood they take, and the cutting of saplings does more harm than almost anything to a forest. It is hopeless thinking of ever getting up a good supply of *large* timber, unless this indiscriminate sort of felling is put a stop to.

6. The Mantidu river. The Mantidu is a very large river and, below Kharkhana Poonjee, capable of bringing down any sized timber between Kharkhana and Barghat; there is a rapid and above Barghat there are falls, and boats cannot go. The slopes on both banks of the river up to Kharkhana have been joomed by the villagers residing in the vicinity. At Pershadwar Poonjee there were a great many new boats, the material for which had, doubtless, been dragged down with great trouble from the jungle on the hill above the Poonjee, which is said to contain some good trees; but as nearly every villager has his own boat (the inhabitants living mostly on fish), it is probable the supply does not exceed the demand for local purposes. There is said to be some good Nagessur jungle near the Mantidu (above the junction of the Lauriang), but there not being sufficient water for floating renders it almost valueless except to the villagers about. The Assistant Conservator hoped to see something of the jungles to the east of Barghat, but the Mantidu having risen, owing to heavy rain, he was unable to get above Kharkhana; on referring to the map, however, it is pretty clear that there are not any streams available for floating out the timber, and the only way would be to scuttle the timber in the jungle, and carry or drag it along the sides of the streams to the large river.

7. The valley of the Rowai or Pranggong (the Puang on the map) a tributary of the Mantidu, contains good forests for a long way, and there is plenty of water for floating for some miles up. Added to this there are no Poonjee there, and the place is, comparatively speaking, easily got at.

There is some jungle said to be found on the banks of the Um Saichampah (the Rowai higher up), but there is not sufficient water for floating; on the Umsong too there is some jungle, but there again the same difficulty presents itself.

8. All along to the west from Jyntcah to Theriaghat, the southern slopes are entirely under pan and shupari cultivation, and there is no forest worth conserving, what little there is of any kind being in small patches here and there along the sides of the hill streams.

9. The Mangat is a fine river, but only navigable to a little above Darang Poonjee; the slopes of it are rocky and precipitous, and there appears to be little or no timber left, higher up the valley about Nongbareh some little jungle is found, but the local demand for boats is supplied from there. Along the valley of Muksa to the north-west of the Nongtalong ilaka there has been good jungle; but jooming has destroyed it, and now the hills are thinly covered with small and badly shaped trees, mostly oak. So long as the fuel supply is not likely to run short, this is not of much consequence, as the Muksa is only a small stream and unfit for floating.

10. It will be seen from the foregoing remarks that there is scarcely any valuable timber forest left, especially where water carriage is available, the people having naturally, where the ground admitted of cultivation, chosen the slopes nearest to the large rivers down which they could get to the bazars in the plains.

11. The best way to get some revenue from these jungles is, doubtless, to carry out the suggestions of the Assistant Commissioner of Jowai.

The system of selling the rights to fell saves much trouble in every way. The toll ghâts, might be placed thus from east to west :—

One at the mouth of the Apha stream.
One on the Noongong.
One on the Hingarea.
One at Jaliakola, on the Mantidu.
One on the Umsong
One on the Rangpani.
One at Daoki, on the Manjat.

12. The main object of these would be to stop all timber under a certain size.

I would suggest that the valleys of the Rowai and Apha be strictly protected, and, as far as possible, no one allowed to go into them until they have been penetrated and it is known what they contain, as these are the only two parts of this portion of the district in which it is believed there are no Poonjies, and which are supposed to contain good forests and are accessible.

13. There is good jungle, too, on the low range about Nokhara (in the Nurpo Dulai Ship), which is now uninhabited; this also should be inspected with a view of finding out what there is there, and if the timber can be brought out by the Rowai after being dragged from the jungle above.

14. The above-mentioned valleys are not very extensive, of course, but it is better to have even a couple of such tracts completely under control than patches scattered all over the district and surrounded by cultivation, and any sudden conservancy of which would probably dissatisfy the hillmen, who cannot understand anything of the sort all at once. After these parts have been taken over a year or so, other tracts that might be near water carriage and of value might be gradually taken up.

Part II.

Forests on the hills.

1. The forests in the following (*viz.* Manso, Shilliang, Montung, Ralliang, Shanpung and Mertiang) ilakas are, on the whole, worthy of but little mention, none of them containing now any really valuable timber.

2. In Mansu circle the only jungles appear to be along the valley of the Mantang River; but though there are some heavily-clad patches of fir and oak, the trees are generally small sized, owing no doubt to the rocky nature of the slopes, which are mostly very precipitous The Mantang is a good-sized stream; but it is of little consequence what the water carriage is like, as all the streams in these parts flow into the Kopili, and floating timber out to the north would, of course, be out of the question.

3. In Shilliang Mantang the jungles are situated on the Umlado (flowing northwards into the Mauriang, the Mantang, and along the valleys of the smaller streams and also towards Barato to the north-east; the sides of the Umlado are well-wooded with Kuksai (fir) and Ratiang (chiefly), and dengwa, sursey, dengan, lepiang, and dingleng. There are some very fine firs close to Shilliang, Mantang, Poonjie on the Manso side, but the jungle is not of any extent. Along the Mantang towards the east from Shilliang, the slopes are well covered with firs of moderate size, but there is not much oak.

4. In Ralliang there are plenty of small sized firs to be found still, but fine trees (that is those which would give planks two feet and more in width) are now scarcely procurable.

Jooming is going on on a large scale, and tracts which a few years back consisted chiefly of large trees, now hold patches only of second class and small ones. Along the valley of the Munsar stream (to the east of Ralliang) there is a quantity of firs on the spurs running down towards the water, but the trees are said to be inferior, the slopes too appear to be very precipitous, and the low ground is made into terraces for dhan khets. Besides kuksai, dingleng, and dengwa are also found in this ilaka.

5. There is not much timber, large or small, in Shanpung circle. Some little jungle being found along the Ummarem Umjurem (in the map) and on the sides of the streams between Shanpang and Latuber, but there is nothing of much value.

6. In Nurtiang ilaka there is some good jungle reported to the north-east, but towards the south and south-east the hills are very bare; to the west, in the direction of Larnai, and all about that part the hills are well wooded with oak, but the trees are mostly small sized. Fir does not appear to grow so freely here as in most other parts. There seems to be (judging from a distance) some excellent jungle to the north and north-west from Larnai, probably in the valley of the Umkhem, along which there is, it is believed, some good forest.

7. It is a difficult matter to know how best to realize revenue on the timber now fit for felling, and how to protect the young trees; to export wood to the plains would be out of the question (at least to start with), and the plan that seems most feasible and would bring in a little revenue, is to introduce sawyers (say half a dozen pairs to commence with) and let them begin sawing such scantlings as are likely to be used in the ilaka, that at the present time contains most mature timber.

8. Depôts might be established at the most central village in each circle, and the surrounding villages might supply themselves from it.

9. This would only be an experiment as every undertaking at first is, and might fail, but it is proposed as the Assistant Commissioner of Jowai (who is so well acquainted with the hillmen) seemed to think that as there is such a demand for wood for building purposes, if sawing were introduced, the people would prefer buying the scantling obtained thereby, to going and cutting them out with the dhaw, as is at present done; the waste too would be next to nothing, all branches being sawn up, and together with odd bits stacked for fuel, and thereby saving to a great extent the felling of fine trees for firewood.

10. To protect the young trees the best plan would be, I think, to pick out the best patches, fence them in, and when the grass outside begins to get dry, have it cut down for a width of 30 feet or so all around to protect the enclosure from fire, as it would be hopeless to attempt to put down the system of firing the jungles, throughout the whole district. The villagers nearest to each patch might be held responsible for any damage done to the trees, and watchers could be appointed to go round and see the plots there, or do whatever might be required and report any damage done.

11. There is but little fear of the wood supply, as in many places the villagers have been sufficiently sharp to get up plantations of fir, by simply throwing in seed broadcast after taking up their crops. If Government would raise plantations in the same inexpensive way near Shillong, Jowai, and the largest Poonjies in the district, there would in a few years be a fair stock of timber to supply all local wants; and with a little extra outlay these plantations might be improved by thinning, &c., and a better class of trees than are at present procurable, obtained.

12. There are several places which are said to contain good forests to the north-west, north, north-east, and east of the aforementioned circles, which might be inspected, but the time of year for this sort of work is the cold weather, when moving about is comparatively easy, and not the rainy season, when scarcely anything of the forests can be seen, and travelling about is rather difficult and usually attended with sickness. The forest officer on inspection should also, when it can be managed, move with the civil officer, as the work is then for obvious reasons better carried out.

13. The following are among the principal kinds of trees found in the Jynteah Hills.

Khasi Names.	Bengalee Names.
Laturnai Dengwa	Nagussur. Champa. Ping.
Ookrai	Moroi. Cham (chela).
Suronkah	Ratah.
Lopiang	Kunnery.
Lukhint	
Lakair	
Cherpya	
Sekha Dengwa	(Gundroi) Kundrar.
Guirk	
Yetalong	
Gutalog	
Dar	

From G. MANN, Esq., Assistant Conservator of Forests, Assam Division, to J. J. S. DRIBERG, Esq., Personal Assistant to the Agent, Governor-General, North-East Frontier, and Commissioner of Assam,—(No. 193, dated Debrooghur, the 17th June 1873.)

I HAVE the honor to submit for the information of the Commissioner the Annual Forest report for the year ending the 31st of March 1873.

Sketch Progress Report of the Upper Assam Forest Division, during the year 1872-73.

SECTION I.

The Assistant Conservator held charge of the amalgamated offices till begining of August, when by orders of the Commissioner of Assam, the office records, &c., were transferred to Gowhatty, where Mr. Aylmer took charge of the same.

2. During the year under review the Assistant Conservator's time has been chiefly occupied in the important work of selecting reserves, and extending the teak plantation at Makoom.

3. The months of July and September were spent at Makoom superintending the teak operations. Beginning of December the Commissioner of Assam having decided on the Durrung district being the first to have a forest officer's attention, the Assistant Conservator was deputed to that district, and arrived at Tezpore on the 11th or 12th, and commenced his operations in selecting reserves a few days after.

SECTION II.

Nambur reserve.

4. The Nambur reserve selected in 1871-72 was sanctioned by the Commissioner, and duly Gazetted in the *Government Gazette*.

Reserves.

5. During the present year four reserves have been selected, reports thereon submitted, accompanied by rough trace maps, for sanction or otherwise. Two have been actually demarcated, which two are on either bank of the "Borelli" situated in "Noydooar" and "Chardooar" respectively.

Number of reserves selected.

Before the end of the year one other reserve in the Mungledye district will have been selected as a reserve, and demarcated, making a total of five reserves in all; but the Assistant Conservator believes the Assistant Conservator in charge Assam division, who has just returned from furlough, does not wish to take up two of the reserves situated in "Noydooar," in which case three reserves only will have been selected and demarcated this year.

Valuation surveys.

6. Forest valuation surveys have been made in the abovementioned reserves, and duly submitted to the Assistant Conservator in charge Assam division.

SECTION III.

Teak plantations.

7. There is only one plantation in Upper Assam, which is situated at Makoom, some 60 miles from Debrooghur. The extension made this year was one acre and a half, *i. e.*, according to the number of plants (1882) transplanted from the nursery. Besides this there was about one-third of an acre laid out in tallies, or seed sown where the tree is intended to grow. Great difficulty was experienced in procuring labor, and had this difficulty not been in the way another two or three acres might have been brought easily under plant.

Labor for plantation.

8. The Commissioner having authorized local labor being imported just for the time teak operations are in motion, every opportunity affording itself of procuring labor, when the officer is about proceeding to Makoom should be taken hold of, for without it a large extension can never be made, and besides the "Nagas" are expensive workmen now, requiring 5 annas each per diem.

9. The plantation has not been cleared since the plants were put in, but require it now.

Cost of plantation.

10. The total cost of this year's extension has been Rs. 87-12 (exclusive of moonshi's salary.)

Area under plant.

11. The total area now under cultivation is about three and a half acres. The plantation has not been visited by the Assistant Conservator since last September, so he is unable to state the progress of the new cultivation. The rest of the plantation was in September last in a most healthy condition, and the plants of a year old were strong and growing vigorously.

SECTION IV.

Field of forest.
Dehing depôt.
Sale of timber.

12. Two hundred and forty-eight logs that were stored in this depôt, were bought in October last by Mr. Haly, Manager of the Saw Mills, for the sum of Rs. 500, this was with the sanction and approval of the Commissioner of Assam.

13. By instructions received from the Commissioner of Assam, the timber in this depôt, *viz.*, 143 logs were put up at public auction sale at Golaghat on 1st November 1873, and realized the sum of Rs. 160-4. The logs were sold in lots.

Golaghat depôt. Sale of timber.

14. During the year under review 70 logs were brought down to Golaghat from the "Nambur" and "Doiyang" forests. These logs were lying last year on the banks of the "Dhunsiri" and "Doiyang." No felled timber now remains on the banks of these two rivers. Six logs of the 70 have been disposed of, leaving a balance unsold of 64 logs.

Timber brought to depôt.

45 of which are lying in the water below the depôt.
19 received in depôt.

64

Cost of work.

15. The total cost of this work has been Rs. 112-9.

Sale of forest boats.

16. From this depôt 11 boats were sold for Rs 300, *i. e.*, 5 for Rs 35 each, and 5 for Rs. 20, and 1 for Rs. 25.

17. These boats and one other were made by the department last year, 1871-72, and cost the department Rs. 140, so it will be observed that great profit has been made in this operation. Two boats still remain in this depôt, and will be kept by the department for rafting and floating operations. The boats were chiefly hullucks.

Amount boats realized by sale.

18. The beginning of this year, 1872-73, this depôt containing 78 logs was on the "Dibru Nuddee." Some nine miles from Dibrughur, and as there were little hopes of ever being able to part with the timber at that place, arrangements were made for removing the depôt to Dibrughur, where a sale for the timber was anticipated. This operation was completed in December, and the logs were put up at public auction sale on the 18th January, and 37 pieces were bought for Rs. 39-10. The remaining logs, 41 were, it is said, buried in sand and scattered in the river, and consequently were not put up. The Executive Engineer has, I believe, expressed a wish to make an offer for the timber so placed, and I would strongly suggest, that if the offer be at all reasonable, it be accepted. Two boats from this depôt also were sold at the same time and place, and realized Rs. 180; Rs. 11-4 respectively. The total proceed of the sale at this depôt were therefore Rs. 230-14, which amount has been, I believe, paid into the Dibru Treasury, and placed to the credit of the Forest Department.

Dibru depôt. Removal of depôt.

Sale of timber.

Two boats disposed of.

I.—INTRODUCTORY.

1. The Lower Assam sub-division, comprising the three Deputy Commissionerships of Kamroop, Nowgong, and Durrung, has been in charge of Mr. A. Percy Aylmer, Assistant Conservator of Forests.

The officer in charge.

2. The offices of Upper and Lower Assam were amalgamated in the end of 1871, and remained in charge of Mr. Forrest till August 1872, when it was deemed advisable to remove the office to Gowhatty, which is more central than Debrooghur, and nearer the office of the Commissioner of Assam under whose orders the forests officers were placed.

The amalgamated office of Upper and Lower Assam.

3. Mr. A. P. Aylmer had charge of the central office from August 1872, till Mr. G. Mann returned from sick leave, the latter officer assuming charge on the 15th of February 1873.

Mr. Maun takes charge of the central office.

II.—INSPECTION OF FORESTS.

4. The first forest inspected was the Jeerung, which is in the Cossyah hills, and was leased in perpetuity to Government by a former chief. The hills were originally all covered with sâl, but from jooming and other causes those in the interior are now merely covered with grass and scrub jungle.

Jeerung forests.

5. The lower hills, or those nearest to Kamroop, are the only ones on which any sâl remains. The forest on these hills escaped owing to there being a dispute as to the ownership of the land, the Kamroop mouzadars claiming it as part of Kamroop, while the Cossyah chief claimed it as part of his ilaka. The dispute was decided by the Deputy Commissioners of Kamroop and the Cossyah and Jynteah Hills in favor of the Jeering chief. After examining this forest, the Assistant Conservator reported to the Commissioner of Assam, that he did not think it advisable to reserve any portion of it, as a yearly rent or large bonus would have to be paid to the Jeering chief; he recommended, however, that some rules should be laid down to prevent the chief felling undersized trees, and that the right of felling should be sold by auction as heretofore.

The lower range only covered with forests.

6. As the Forest Department have since taken up the Matyekar reserve which is situated in the same range, it seems desirable that some of the Jeerung hills which adjoin and are well stocked with sâl should be added on to this reserve. After conferring with the officer in charge of the division, the Assistant Conservator will forward proposals on this subject for the sanction of Government.

Advisable to reserve some of the Jeerung hills which adjoin Kamroop.

7. The forests in the Kamroop district have all been examined, and the three sâl reserves which were proposed, have been sanctioned by Government.

Kamroop district.

8. Their total area amounts to 38½ square miles. In addition it is intended to add on to these reserves some small patches lying near them, and proposals for their reservation will be sent on for the sanction of the local Government.

Area reserved.

9. The Assistant Conservator did not examine the forests of Northern Kamroop, as from the information he received there did not appear to be any worth reserving. Mr. Mann, who had examined this part of the district, was of the same opinion.

Forests of Northern Kamroop.

10. A large portion of the hills in the mouzahs of Bogai, Lookee Rannee are more or less covered with sâl, but are inhabited by Garrows and Cossyahs who require the land for jooming, and in some places isolated patches of a few acres in extent were met with generally surrounded by paddy land or near large villages, these have been left as open forests, owing to the difficulty of properly looking after them if reserved, and also to meet the local wants of the inhabitants.

Forests not reserved.

11. The next forests examined were those of the Nowgong district, proposals for three reserves, two of sâl and one of mixed forest, were sent in, and the sanction of Government has been received for their reservation.

Nowgong district.

12. The total area reserved is sâl forest, 10¾ square miles, and mixed forest 65 square miles. The only patches of sâl left in this district are in the hands of the tea planters, one of the reserves (the Khola haut) was formerly the property of a tea company, but afterwards reserved by Government. It is not intended to make any additions to the reserves in this district.

Area reserved.

13. The forests of the Durrung district were examined by Mr. Forrest, Assistant Conservator, Upper Assam sub-division, and three reserves were proposed.

Durrung district.

III.—PLANTATIONS.

14. A small experimental teak plantation was formed near the Koolsee river, in the Kamroop district.

Experimental teak plantation.

15. The order to commence this plantation was received so late in the season, that only a small area could be planted out, and the expenditure was greatly increased by the clearing being done in the rains, as all trees and jungle cut down had to be carried away by coolies; whereas, if the land had been cleared at the proper time (December and January), all the jungle and trees could have been burnt on the spot.

Plantation made too late in the season.

16. The results of the year's planting, however, has been most satisfactory, and though the young seedlings were transplanted near the end of the rains, very few vacancies have occurred. Full particulars concerning the plantations will be found in Appendix A attached to this report.

Result of the year's planting.

IV.—TIMBER OPERATIONS.

17. The only timber operation in the Lower Assam sub-division during the year was that noticed in the Government of Bengal's Resolution on the forest progess report of 1871-2. This was a contract to fell and bring to Gowhatty 150 logs.

Timber contract.

The contract was given in order to meet the local wants in Gowhatty, and also as an experiment to test the value of timber in the local market.

18. Some fifty logs were brought to Gowhatty early in October at a cost of about Rs. 5-8 per log, or 6 annas per cubic foot. They were sold by public auction, and were bought in eagerly at an average rate of about 15 annas per cubic foot.

Logs sold at Gowhatty.

The contractor promised to deliver the remaining 100 logs in a short time; this he failed to do, and in March he was warned that if the timber was not delivered in two months that the department would bring it out of the forest, and up to Gowhatty at his risk; ten logs have since been delivered, and 30 more are close to the bheel, the latter ought soon to reach Gowhatty; the remaining logs are still in the forest.

19. The experience gained from this contract shows that it is quite useless to give contracts for large timber to persons who have not elephants to drag it out. On one occasion the Assistant Conservator found between 30 and 40 men pulling one log, and though not a very large one, they could not move it more than a few inches at each pull. One of the departmental elephants being near the spot, the Assistant Conservator ordered her to be harnessed to the log; this being done, she walked away with it without any great exertion, much to the astonishment of the men who had been dragging at it.

Useless to give timber contracts to persons without elephants.

20. Should the contractor fail to perform the rest of his contract, the logs will be brought in by the department, and after giving him credit for logs brought in, and a fair value for the timber cut and partly dragged, should there be any balance due, he will be made to pay.

The Contractor failing to perform his contract.

The Assistant Conservator would be more severe on the contractor, but that he is of opinion, that the failure in his contract is not due to any fault of his, but simply to the impossibility of extracting large logs by manual labour.

V. GENERAL.

21. The result of the years' operations is this, that the forests of Lower Assam have been all examined and the valuable parts reserved. The department have now to do with a fixed area of known forests instead of with hundreds of square miles of unknown.

Results of years' operations.

22. It is intended to form one working plan for the Kamroop forests, and to commence a regular systematic course of working from next cold season. With regard to the reserves of Nowgong, it is not intended to work them at present, and all that will be done with the sâl reserves is to try and exclude the jungle fires and to get the ground more closely covered with sâl. The reserves in Durrung will also be allowed to rest, with the exception that the caoutchouc trees will be polled to get strong shoots for next year's plantations.

Working plans.

23. The establishment at present allowed for looking after these reserves is as follows:—

Present establishment.

		Rs.	A.	P.	
For Kamroop.					
1 Forest Ranger, 2nd class	... ...	25	0	0	per mensem.
5 Watchers, at Rs. 7 each	... ...	35	0	0	„
For Nowgong.					
1 Forester, 2nd class	... ...	14	0	0	„
4 Watchers, at Rs. 7 each	... .	28	0	0	„
For Durrung.					
1 Forester, 2nd class	... ...	14	0	0	„
4 Watchers, at Rs. 7 each	... ...	28	0	0	„
	Total ...	144	0	0	„

For Durrung and Nowgong this establishment is sufficient; but application will be made to increase the establishmant of Kamroop, which is found to be insufficient.

24. The Assistant Conservator of Forsets is not allowed any office establishment or even personal peon, though he has to correspond in the vernacular with the foresters stationed in the Durrung and Nowgong districts, and has to keep long accounts and statements connected with the plantation and other divisional works.

Office establishment required.

25. The division lost one elephant during the year, from *zraarbad*, a disease very fatal to elephants. It commences with a swelling under the throat, which spreads, in the last stages, right under the entire stomach, and eventually stops respiration. The remaining three elephants are in good condition.

Elephants.

26. Much inconvenience is felt by the Public Works Department applying for timber at any time in the year and without any notice. As there is no stock of timber kept on hand, the Assistant Conservator has to cut some 200 logs during the rains, in order to supply an indent of the Public Works Department, which was only submitted at the end of the working season.

Inconvenience caused by the Public Works Department not applying in time for timber

27. With the working plan proposals for establishing a timber depôt on the Koolsee will be also sent in. It is hoped by having this depôt at a place where large boats can come up any season of the year, and by having one large yearly sale, to attract the timber merchants and others interesed in the trade from Dacca and other places.

Depôts.

There. then, will be a greater competition and better market for the timber, and it is not only hoped, but expected, that the Kamroop forests will yield a handsome yearly return at reserve; while at the same time, by a systematic course of management, the forests will increase rather than deteriorate in value.

APPENDIX A.

Copy of Journal

of

Plantation operations in 1872.

Description.—A gentle slope towards the Koolsee, near the bend of the river in the south of the proposed plantation reserve. The general inclination is to the south, becoming level as it nears the river.

Soil.—Same as that described in the general account of the reserve.

Area.—7·48 acres.

Natural vegetations.—Young sâl, with korai, kamranga, and a few toon growing thinly in heavy grass jungle. All these trees were small, and the ground had evidently been cultivated about 12 years' before.

Operations.—Clearing of jungle was commenced in July, and finished on the 15th of September.

Seed—The seed was of three classes—

1st—Burmese seed of 1872;

2nd „ „ of 1870, had been kept in tins in the Gowhatty forest office since June 1870.

3rd—Seed of teak grown in Gowhatty.

Planting.—With the exception of half an acre planted directly, the seed was all sown in nursery beds.

These beds were slightly raised, of a breadth of four feet, and separated by small paths The area of the nursery was 68 by 75 feet.

Seed in nursery.—The seed was planted in the nursery on the 7th of July 1872, and by the 25th of the same month had almost all germinated.

That brought from Burmah in 1872, germinated quickest and most regularly.

That of 1870 was slower but equally good.

The Assamese seed came up much thinner than either of the others.

Seed planted directly.—The half acre planted directly, was from the Burmese seed of 1872, and germinated equally well with that in the nursery. It had been sown at stakes, six by three feet, and five seeds were put down at each stake.

Transplanting.—Seven acres were cleared and staked six by six feet. The grounds where the plants were to be placed, been worked and softened to the depth of about one foot. The ground between the lines being hoed and weeded.

The transplanting commenced on the 1st of September, and was finished on the 14th; many plants still in the nursery, not being planted out by reason of the scarcity of labor.

At moment of transplantation the plants averaged three inches in height, and were dug out with *daos* or bamboo instruments resembling a small trowel.

The tap root was from three to four inches in length, and the plants were carefully removed with the earth adhering to their roots.

They were carried in small baskets to the places prepared for them at the stakes.

Mr. Aylmer left the plantation in charge of a chowkeydar, and one cooly from the end of September until the 31st of March, during which time some vacancies caused by the lateness of planting were filled up, and those parts where the jungle appeared heaviest were cleared.

Further operations to the end of the financial year 1872-73.

Expenditure.—The expenditure on account of the plantation up to 31st March 1873 was Rs. 415-1-6. Particulars of the expenditure are given below:—

Particulars.	Amount. Rs.	A.	P.
Collection and transport of seed	27	0	0
Cooly hire at plantation	315	0	0
Pay of plantation moonshee	34	1	6
Pay of plantation peon	5	0	0
Pay of plantation chowkeedar	21	0	0
Clearing teak plantation for 1 month and 17 days ..	9	0	0
For sundries	1	0	0
Total ..	415	1	6

Koolsee Plantation,
Dated the 1st April 1873.

A. P. AYLMER,
Asst. Conservator of Forests, Lower Assam sub-division.

No. 501, dated Chittagong the 7th June 1873.

From—H. HANKEY, Esq., Offg. Commisioner of the Chittagong Division,

To—The Conservator of Forests, Calcutta.

I HAVE the honor to submit the annual forest administration report of the Chittagong division for the year 1872-73.

2. The following statements have already been submitted to you with my letter No. 429, dated 21st instant—

(1). Area of reserved forests.
(2). Area of unreserved forests.
(3). Area of plantations.
(4). Prosecution for breaches of the forest rules.
(5). Area of forest tracts protected from fire.
(6). Annual summary of revenue and expenditure during the year 1872-73.
(7). Annual abstract account of cash transactions.
(8). Annual statement of outstandings and liabilities on account of contractors and disbursers.
(9). Statement showing the description of work done, quantity of timber removed, and amount paid during 1872-73.
(10). Annual account of forest revenue.
(11). Abstract statement of forest revenue showing remittances to treasury on account of 1871-72 and 1872-73.
(12). Statement of timber brought to depôt from the different forests during 1872-73.
(13). Annual timber account for 1872-73.
(14). Statement showing the amount realized on account of the different classes of timber sold during 1872-73.
(15). Statement showing the quantity of timber felled and brought to depôts during 1872-73.

3. The present report may be divided into six parts, namely,—1st the preliminary chapter describing the measures which have been adopted with a view to the introduction of the forest conservancy into the Chittagong division; 2ndly, inspection of forests; 3rdly, the chapter treating of reserves; 4thly, plantations; 5thly, yield of the forests; 6thly, general remarks.

4. At the beginning of the year 1868 the district of Chittagong was visited by the Conservator of Forests, Lower Provinces, Bengal with the view of taking steps towards the introduction of forest conservancy in the Chittagong division. In order to prepare the way for such action as might subsequently be approved by Government, a notification was issued with the consent of my predecessor, Lord Ulick Browne, warning all persons engaged in timber felling, to make due provision in all contracts and agreements they might make for any orders that Government might subsequently pass to protect the forests, in order to prevent any claims being brought forward on account of agreements made.

5. A copy of the notification is subjoined.

FOREST DEPARTMENT NOTICE.

It being the intention of the Government of India to reserve, in the forests which are the property of Government, certain kinds of timber as per list given below, and to prohibit felling of this timber, except under such rules and regulations as may be hereafter notified, the public are hereby warned to make due provision for any orders which the Government of India may hereafter issue regarding the felling of timber in Government forests, in any contracts or agreements they may enter into for the felling and supply of the timbers here named.

1. Bota.	6. Jarool.	11. Simool.
2. Checkarussee.	7. Kandep.	12. Tali.
3. Gamar.	8. Koonkho.	13. Telsar.
4. Gurjun.	9. Petraj.	14. Toon.
5. Jam.	10. Shaen.	

6. In the absence of any precise information which was deriveable only by means of valuation surveys, the Conservator of Forests roughly estimated that there were about 1,500 square miles of workable timber forests in the Chittagong Hill Tracts. He proposed that a notification should issue declaring the forests in the Hill Tracts to be Government forests, and that certain tracts should be defined, within which the felling of reserved timber should not be allowed except under agreements and permisison given by the authorities. No proposals were made for the introduction of forest conservancy into any portion of the Chittagong *Regulation* District.

7. The opinion of my predecessor having been invited on the proposals made by the Conservator, Lord Ulicke Brown deprecated any sudden change over the whole of the Hill Tracts, but advocated the *gradual* introduction of forest conservancy into the Hill Tracts. He proposed that the following tracts should be reserved as Government forest lands in the first instance—

1*st*.—All country contained in the bend between the Kassalong river and the Kurnafoolee.

2*nd*.—All country to the east of the Soobalong stream (an affluent of the Kurnafoolee a little below Kassalong) and to the east of the southern half of the Rankheong as far as the district of Akyab.

8. He further suggested that all contractors and wood-cutters should be made to pay a small sum for licenses, in addition to the amount paid in the shape of river tolls, and that trees measuring three cubits in girth, four feet from the ground should not be cut down and burnt by the joomeahs. He proposed also that the Assistant Conservator should be under the direct control of the Deputy-Commissioner and the Commisioner.

9. The Government in its letter No. 788, dated 25th February 1869, conveyed a general approval of almost all the proposals made by Lord Ulick.

10. In August 1870, Mr. H. H. Davis was appointed Assistant Conservator, and a small establishment was temporarily employed to enable him to keep a record of the forest produce coming down the Kurnafoolee river as a preliminary to taking charge of the toll stations. It may be here observed, that revenue on timber and other forest produce was up to this time collected through the agency of the hill chiefs at certain toll stations established on the main rivers, namely, the Kurnafoolee, the Fenny, the Sungoo and the Matamooree. An *ad valorem* duty of 5 per cent. was levied on the forest produce passing by the toll stations, the value being rated at the market price at Chittagong, and corrected from time to time. These tolls were farmed out for various periods at a fixed yearly rate of payments to the Bohmong the Mong Rajah and the Ranee Kalindee.

11. Shortly after the apointment of the Assistant Conservator, the Conservator of, Forests, in consultation with my predecessor, submitted a notification to Government for publication (if approved) in the *Calcutta Gazette*, defining boundaries of Government forests and of reserved areas in the Hill Tracts.

12. Under the notification in the *Calcutta Gazette* of 1st February 1871, the forest tracts specified below were declared to be Government forests in accordance with the provisions of section 2nd Act VII of 1865. The area of the Government forests included in this notification aggregated 5670·5 square miles.

BOUNDARIES.

North.—The Fenny River, Hill Tipperah and south boundaries of Cachar.

South.—The Akyab District. East.—The British frontier.

West.—An imaginary line drawn from Ramghur on the Fenny to the Kahareemoni Hill station on the watershed between the Hulda and Chingree streams, where it divides into two spurs; and following the south-eastern spur down to Seetapahar on the Kurnafoolee river. Thence the watershed between the Nurha and Maringree streams, descending between the Persurah and Nabok streams to Runkabeira on the Sungoo along the watershed between the Doloo and Sungoo rivers, descending the watershed between the Doloo and Bonoo rivers to the Mamoree river at the junction of the Bonoo river. Thence across the Mamoree river along the watershed on the west, ascending by the Bhagkalee river, skirting the hills to Twalleding, the boundary between Chittagong and Arracan.

13. The following reserved tracts were proposed to be notified:—

No. I. The Kassalong reserve (area 875 square miles). North, Hill Tipperah and Cachar. South, the Karnafoolee river from Kassalong to Burkhal falls. East, the Barkue and Sirthay Tlang ranges. West, the Myunee and Kassalong rivers.

No. II. The Soobalong reserve (area 91 square miles). North, the Burkhul Tong. South, the head waters of the Soobalong river. East, the Sychul range. West, the Soobalong river.

14. As regards notifying the boundaries of "reserved forests" it was distinctly enjoined by Government that no action should be taken until further orders. In the Government forests, the control of the Forest Department extended only to preservation, as far as possible, of certain valuable trees (reserved trees) by prohibiting the felling of such trees below four feet six inches in girth at four feet six inches from the ground.

15. The following is a list of the several kinds of timber that were proposed to be reserved—

1ST CLASS.	2ND CLASS.	
1. Jarool.	1. Tellour.	5. Telee.
2. Chaplis.	2. Boilsur.	6. Ichungree.
3. Kandeb.	3. Jam.	7. Petraj.
4. Gamar.	4. Garjun.	8. Boirock.

3RD CLASS.

1. Torokhaung.	5. Bohul	9. Badee.
2. Kurrie.	6. Horitoky.	10. Chakooa.
3. Bandaloha.	7. Vooga.	
4. Oorum.	8. Karful.	

16. The subjoined schedule of rates was proposed by the Conservator of Forests to be levied on reserved timber and all other forest produce in this division.

No timber of the first and second class to be felled under three cubits in girth at the place of felling. No timber of the third class to be felled under two cubits at the place of felling.

First class timber to pay toll at the rate of Rs. 12-8 per ton or 4 annas per cubic foot.

Second class timber to pay toll at the rate of Rs. 9-6 per ton, or 3 annas per cubic foot.

Third class timber to pay toll of Rs. 6-4 per ton or 2 annas per cubic foot.

Per log Re. 1; house-posts 4 annas; saplings 2 annas; Oorah bamboos, at Rs. 10 per 1,000. Daloo, at Rs. 5 per 1,000. Moolee, at Rs. 2 per 1,000. Canes, at Re. 1 per 1,000; grass at Rs. 2 per 1,000 bundles, 1 foot 6 inches in girth.

Round timber contains 50 cubic feet to the ton. Converted timber contains 40 cubic feet to the ton.

Boats will be classed as converted timber, and be measured by centre girth and length. Toll to be paid according to class of timber of which they are made.

17. The Commissioner recommended a reduction of 25 per cent. on all timber logs, saplings, and grass, and the Government approved of this recommendation in January 1871 as a provisional measure, subject to modifications hereafter, but no modifications have been made or proposed to be made up to date.

18. At the recommendation of Mr. Commissioner Bayley, the tolls collected at river stations were transferred on 1st April 1871 to the Forest Department, with the exception of the tolls on the Fenny river, which have not been made over to the Forest Department pending the decision of Govrnment as to the proportion in which the collections are to be divided between Government and the Maharajah of Hill Tipperah. The final orders of Government have not been recieved up to date. Compensation for the loss of forest revenue has been granted to the Ranee Kalindee and the Mong Rajah, at the rates of Rs. 1,143 and 153 respectively per annum. No compensation has been given to the other chief, namely, the Bohmong, as a punishment for his misconduct during the Looshai Expedition in 1872.

19. It appears that subsequent to taking over charge of the river tolls, the Forest Department issued permits to the "Capitans" or leaders of gangs of wood-cutters, who resorted to the forests to cut timber, and certain restrictions as to size of timber to be felled were entered on the permits, undersized timber was confiscated at the toll station. The "Capitans" paid a fee of Rs. 5 for registration of their hammer mark, and 8 annas a head for each coolie who accompanied him to go up and fell or purchase timber before permits were given to them.

20. In July 1872 I reported to Government that the Forest Department should act only as a part of the general administration of the Hill Tracts, and not as a separate and independent department with separate and conflicting interest; and that the Commissioner of the division should be declared Conservator of Forests in his division.

21. I further recommended the abolition of the permit and hammer-tax, and remarked as follows: "my ideas of the duties of the Forest Department, in a district like the Hill Tracts is, that they should be limited to the preservation of timber. I would do away with the permit and hammer-tax entirely, and leave settlements of every kind in the hands of the Deputy Commissioner subject, of course, to forest instructions; that is to say, any kind or size of timber that the department wished to reserve to be distinctly excluded from each settlement. Further, that any lands on which the department desired to establish nurseries on should be made over on application. The tolls as at present to remain in the hands of the department." "My contention is, that the permit system is incompatible with the settlement system, that the two being practically the same cannot have an independent existence. They cannot co-exist side by side."

22. The Government in letter No. 3535, dated 12th August 1872, appointed me Conservator of the Chittagong Government forest, and placed the Assistant Conservator entirely under my orders. In His Honor's view the sole duty of forest officer in Chittagong Government forest was to collect the tolls at the toll stations on the river, and the issue of permits was entirely unauthorized. It was further decided by Government, that the revenue collected from tolls or for cutting timber, not grass, bamboos, &c., should be credited to forest revenue.

23. Subsequent to the Commissioner being declared Conservator in his division, I recommended the retention of the permit tax, and wrote to Government as follows:—"At first sight I may be charged with inconsistency in recommending the retention of the permit tax which I so repeatedly and forcibly denounced previous to the Commissioner being declared Coservator of Forests. The inconsistency will be found to be only superficial. The change of management has robbed the tax of all the objections that hitherto attached to it. The basis of these objections were, that the tax tended to produce collisions between two

classes of tax payers, *i.e.*, settlement-holders and permit-holders, my contention was, that a permit was *de facto* a settlement defective and vague in its terms only for want of knowledge to make it more definite and precise. It was, therefore, an infringement on the functions of the revenue authorities, and collision between department and par consequence between the parties deriving authority from conflicting authorities was inevitable.

24. "Now, however, that the revenue authorities conserve their own forests these objections have of course disappeared. There can be no conflict; no disguise or misapprehension as to the nature of this permit or the rights which it conveys. It is, in fact, a license to cut timber or forest produce on such tracts of land as have not been separately settled. Holders of settled lots do not require a separate license or permit to cut the timber on their lots. In this view, therefore, the retention of the permit tax will be found not only reasonable but necessary as an indispensable source of revenue."

25. In accordance with the above recommendation, the Government in letter No. 4756, dated 12th November 1872, sanctioned provisionally the retention of the permit tax, and likewise the proposal to keep up the hammer mark, but abolished the fee hitherto levied for the certificate.

26. The duties to be assigned to the Assistant Conservator have been clearly stated by Government. 1st, that he should have the entire supervision of all forest produce settlements; including the surveying and testing the surveys of the different lots. 2ndly, the collection of the Government revenue under this head. 3rdly, the decision in the first instance of all disputes and objections having reference to the said forest produce settlements.

27. Having given above a resumé of proceedings taken for the extension of the Forest Department, I will now proceed to treat of the subject of "Inspection of Forests." In inspecting the forests, the system which is pursued appears to be to hold route valuation surveys by means of measuring the road travelled over continuously for distance of one or two miles every here and there, and to have the trees within half a Gunter's chain on either side of this tract counted and classed according to size.

28. In the first year of inspection, Mr. Davis inspected the forests between the junction of the Soobalong and Kurnafoolee, as far as Bellasurree, a distance, of about 22 miles, and the tract between Kassalong and Khurkorea, about 35 miles, as well as the forests bordering on the Kassalong between these places and those along the Kurnafoolee as far as the Burkhul Falls. He reported "the cuttings that have been carried on during past years have told very much on these forests, and timber is very scarce in places where it has been easy to get out, the borders of streams being entirely denuded. Whilst further inland, where the woodman has not been able to get out a log, the boat-digger or surveyor has taken his place, and everywhere the most valuable trees have been taken out, whilst the more abundant and fast growing kinds, such as gurjun are still plentiful. Toon has been nearly eradicated, and other kinds of valuable woods have only just been saved in time. Had unlimited cutting continued for five years longer, I venture to say, mature jarool, chaplis, and woods of a similar class would not have been found in the forests bordering on the Kurnafoolee or Kassalong rivers."

29. In the year 1871-72 Mr. Davis explored the forests on the Kurnofoolee river, and its tributaries the Renkeong, Soobalong, Kassalong, and Myanee, and also between the Burkhul and Demagiree ranges. His linear valuation surveys showed the existence of considerable quantities of the valuable kinds of timber in these tracts. These surveys extended along 44 miles of forest equal to an area of 331 acres, in which 750 first class, 695 second class, 1,113 third class trees, and 5,783 saplings were counted.

30. The inspection made by the Assistant Conservator in the year of report will appear from the following paragraphs quoted in extenso from his report. "During last cold season the forests on the river Kurnafoolee and its tributaries, Kassalong, Myanee, Soobalong, and Renkheong, were visited and reported on in last annual report, leaving unknown the resources of the different rivers in the south of the district, and the Fenny in the north. Of these this year those in the south have all been visited, and in addition the forests in the Sillock."

31. "Before moving south the forests on the Sillock had to be visited and examined with a view to ascertaining their value in regard to the forest produce leases that have been given. There are four blocks known as lots Nos. 2, 3, 27, and 28, and comprise about 10,000 acres. Three of them 2, 27 and 28 are held under settlement by one individual on an annual rental of Rs. 600. Lot No. 3 was this year applied for by the same party, but a portion of it falling within boundaries given for plough cultivation, no settlement was given.

32. "These tracts were visited by me twice during the season, first in November and again in December. The object of the first visit was to test old surveys of the blocks and obtain some idea of their position and contents. On the last to commence survey of a new lot for which the same party had applied for a forest produce lease.

33. "I found the previously surveyed lots fairly correct, considering the heavy jungle through which the survey had to pass in some places. The value of the forests had to be considered from two points, the timber and their other products, and the means that exist for bringing such to market. Though these forests do not contain sufficient valuable timber trees to justify my recommending their being reserved, nevertheless, there is a fair supply of inferior wood, such as, gurjah, jam, and baddee, with a few of the better kinds dispersed

amongst them, and thus leaving out other minor produce would admit of an assessment far higher than is at present paid, especially as the situation adds considerably to the value of the blocks, which have the Kurnafoolee on one side, and the Sillock on another, at no great distance, and the Chittagong market, within 25 miles by water. That portion that is nearest the Kurnafoolee can at any time of the year send its produce to market, but it is not so with the Sillock side, as this river can only be used for floating during the rains, and hence it is that the Sun Kholas on its immediate vicinity are of comparatively little value, owing to the sun grass not being fit to cut before the river falls. The large number of gurjun trees yield a fair return in supplying gurjun oil, for which each man that taps the trees has to pay the lessees Rs. 2 to 5 per annum. In addition to the above, these tracts produce bamboos, canes, and occasionally dug-out canoes are made in them. Taking all things into consideration, I am of opinion, that a fair appraisement would be eight annas per acre, and would recommend that on expiry of the present lease, the lots should be put up to auction, and the right of collecting tax be sold with the above at an upset price.

34. "Survey of the lot applied for this year has been completed, but there is a doubt about the land being situated in the regulation district.

35. "Of the rivers in the south, the first visited by me was the 'Htursa' up which stream I went as far as the 'Kemee' Kheong occupying seven days in getting up. The whole of the country has been joomed, and I do not think it possible to bring out more than three or four hundred trees. Nothing in the shape of a forest is now to be seen. From the number of logs lying in the bed of the stream, it would appear that formerly a large quantity of timber was floated down, but that owing to scarcity of water in the stream, many logs were abandoned, other causes may have likewise contributed to their being left where they are, such as the rafts and lashings smashing by the freshets coming down suddenly. On the jooms many trees are to be seen lying and rotting, having been felled solely to avoid their shading the crop. Many of these logs are still of value and I consider it should be made imperative for them to be brought out before any more living trees are felled.

36. "After returning down the 'Htursa' I proceeded up the 'Sungoo' to Modhookhong. The stream as far as Tinchee has sufficient water to admit of canoes of about 80 maunds going up, but beyond Tinchee it is full of rapids, and at and above Thendoo the bed is nearly blocked up with immense boulders; and it is remarkable, that from this point the stock of valuable timber trees increases in the same ratio as the difficulty of getting the timber to a market increases, and probably for the same reason. There is another cause to which the richness of the forests here may be attributed, and that is, that the Mughs do not joom in this remote locality for fear of the wild tribes, and the few jooms that there are, are those of the Kumies and Maroos.

37. "From Modhoo I left the Sungoo, and marched across to the Kolladyne and back, taking three days going and returning. My motives for going were first to ascertain the comparative values of the forests in the different districts, and secondly, to ascertain whether the teak or caoutchouc trees grew in this direction. With regard to their comparative values, those on the Kolladyne side were far superior in point of stock, whilst in value they are simply without any market, and this alone will account for the existence of so much timber, whereas the great demand and consumption in Chittagong has reduced our forests partly to their present state, and I have doubt but what our forests were originally as well stocked, and that natural reproduction has not been able to keep place with the constant jooming and cutting. There is no difference whatever in the kinds of timber trees of the two districts.

38. "On returning from the Kolladyne, I retraced a portion of my way along the Sungoo to Tinchee, and from there struck across the Yamboug Tong and descended into the 'Slama,' following its course to where it empties itself into the Matamoric. From the summit of Yamblong a magnificent view of the surrounding country and forests can be had, comprising at a glance many miles of country, showing clearly the various timber-clad parts and jooms, conveying a far better idea generally of the contents of the forests and their distribution over the country, than it would be possible to obtain by passing through only portions of it. To travel over the whole country, if possible, would take years.

39. "On the Slama there is very little timber of any value, and the river bed a little above Thung Lowen Roa is one mass of boulders, and utterly impassable for boats or rafts.

40. "Up the Matamoree I went eight days journey beyond its junction with the Slama, and after passing the Lagada on the fourth day got into fair timber country, and obtained valuation surveys in one or two places where the features of the country admitted of such, but as a rule there is great difficulty in holding valuation surveys in these hills. Owing to the dense undergrowth it is a matter of considerable trouble to get into most places, and when once in, it is very often impossible to get out except at the spot where you enter, the hills being mostly broken, and their sides being precipitous, it is impopssible to get out by descending elsewhere, and the only course is to find an elephant tract, but this again frequently only leads through bamboos and grass jungle. Putting all these natural obstructions aside, the branches and leaves of the trees in the forests interlace so much, it is difficult to say to which trunk they belong, and the matter of distance from the line of survey has to be decided purely by guess work, as it is very often impossible to get near enough to the tree either to measure the distance or its circumference, so that on the whole I am inclined to

think, that these linear surveys are calculated more to mislead, than to give any accurate idea of stock in mixed hill forests.

41. "After exploring the Matamorce valley to the utmost extent possible, I crossed over the Mraing Tong range, and marched along the Phalaing Kheong, following its bed to where it joins the Pawah or Bagkhallie, and then to Gurjunia and Ramoo. The country drained by the Bagkhallie is nearly destitute of valuable timber, the whole of it having been cleared away by jooming. From many of the peaks and ridges along the line of march, the whole of the country lying below could be seen, and both old and new jooms were distinctly discernible, covering nearly the whole country.

42. "From Ramoo I retured to my standing camp at Chundergonah by the sea-face, having been away sixty days and over 400 miles. To sum up briefly, it will be seen that owing to heavy cutting to supply the market, and to admit of jooming, our forests have been cleared away, and we have only two left of any value. One on the Sungoo commencing at Thendoo, and the other on the Matamorec beyond the Lagada. A glance at the maps of the district will show the remoteness of these localities, and it will then be understood further on, why I condemn the idea of forming reserves."

43. The tracts proposed to be *reserved* (as mentioned in para 13) have not been approved by Government, pending an exploration of the forests by the Assistant Conservator, and an acquisition of comparatively accurate and definite knowledge of the forests. On the subject of reserves, Mr. Davis writes in the following terms

44. "If it should be considered absolutely indispensable to have reserved forests, the tracts I would recommend as reserves are those drained by the Myanee, from where it joins the Kassalong to its source, the Rinkheong above Phuroh, the Kurnafoolee above Ootrun Chutra, the Sungoo above the Thendoo Kheong, and the Matamorce above the Lagada Kheong.

45. "There are many reasons why reserves cannot be of any possible advantage in these hills, and I will proceed to show why they must be ineffective, and what I propose would answer quite as effectually without involving anything like the same expense as would be required for reserves.

46. "In the first place it is clear, judging from the data we possess, of the last two year's consumption, that about 745 tons of timber in logs, 430 tons of beams, planks, and crooks, and 667 tons of timber for canoes is required annually to meet the present requirements of Chittagong; and say we add only the same quantity of boats, leaving out the timber in logs and planks for the requirements of the Hill Tracts (we do not possess any statistics of their consumption), it becomes necessary for these forests to yield annually about 2,500 tons of timber of the better kinds, whilst inferior wood, house-posts, and saplings, on an average, 8,813, would be required; but for this there need be no provision made, for we have more useless wood than can be possibly required for ages, and it is this inferior fast growing wood that springs up and shuts out the more valued kinds which accordingly become rare.

47. "To me it appears very doubtful whether the forests bordering on rivers will continue their present rate of supply very much longer, and it has for some time been clear, that each year the wood-cutter has further to go and more difficulty both in finding out and bringing out large timber, and it is equally certain, that so long as there is a large consumption and good demand, and there is any timber left in the country it will be brought out by the enterprising woodcutter, no matter where it grows, what the cost or difficulty, and, therefore, he may be safely left to secure his immediate wants as best he can. To put a limit to the quantity to be felled yearly would now be of little use, it should have been done years ago; and would simply give cause for complaint now, without there being any possibility of the forest recovering themselves by natural reproduction. What then have we to gain by having reserves? If our forests were compact, of any value, and situated so that their timber could be easily taken to market, or in other words, if we had any really good forests that might be improved by care and outlay, I should say by all means preserve them to the utmost, but such is not the case. Over vast wild and uninhabited country we have scattered tree forests, some parts of which are better stocked, owing to their inaccessibility than others, but all presenting alike a scattered mixture of good and inferior wood. I presume the whole country could not be reserved, and, therefore, if a part of it was closed as reserves, all the unreserved portion would be open, and it would naturally be resorted to in preference to the reserved portion, where strict rules and regulations would have to be observed, all then that would be gained at the outside would be that, the best places would be closed, which could be done just as effectively by administrative measures and orders from the Civil Officers.

48. "The whole of the timber country is uninhabited, and many miles away from villages of any kind, so that it would be difficult to get watchers or persons in charge of the reserves to live in them, except there were a number of them in each, even if they were entertained in sufficiently large numbers to admit of their living in the forests, they would require at least one trustworthy officer in each reserve, otherwise they might dispose of any quantity of timber without detection, besides which, I doubt whether any persons living in the forests all the year round would keep their health, and this would be really necessary, as men go up all the year round in the cold and hot weather for beams and planks, and in the rains for canoes and logs.

49. "What I propose as far more effectual and feasible is to abolish the idea of reserves in a country like this as perfectly impracticable, and to take advantage of the means nature has provided. We have large rivers down which all the timber must come; and any rules and laws can be quite as rigidly carried out by results being watched from the inhabited parts as by their actual observance in the forests. If sanction would be accorded to the employment of a small conservancy patrolling staff, it might be useful in helping to bring home to any person any breach of forest laws. I do not believe anything more is wanting, except it is effective rules to ensure our doing what we please with the forest. The present toll collecting staff answers both as revenue collectors and a check on the size of timber brought out, in like manner, it could be made the means of restricting the outturn of the forest should it be considered necessary to limit such.

50. "The next question is, how are we to meet future requirements. To me it is quite evident that natural reproduction alone cannot be relied on and that we must have recourse largely to planting, taking our present requirements as a guide to what we have to replace, and thus each years' outturn will show what we must plant to supply in course of years what we are now extracting from the forests.. Each acre should have 100 mature trees standing on it after all thinnings are taken out, this would show that we must have 12 seedlings for every tree we intend to leave, but to be safe, I think at the least 25 seedlings should be planted for every log now brought down. This then will give us in lieu of a scattered, mixed, worthless forest, a valuable compact manageable forest, instead of patching up a wreck, we launch a new craft."

51. Regarding reserves, the Deputy Commissioner of the Hill Tracts makes the following comments on the views expressed by the Assistant Conservator of forests as cited in the preceding paragraphs.

52. The Deputy Commissioner says, "the conclusion arrived at by the Assistant Conservator seems to be that there exist no particular parts of the district which are fit for reserve forests, save such portions as are extremely remote, and the inaccessibility of which has alone saved the timber from destruction by joom or felling. In this conclusion I concur, and I respectfully beg to support Mr. Davis' recommendation that we should abandon the idea of setting aside tracts of land as reserves, until such time, at least, as we possess tracts upon which anything worth preserving is found.

53. "In speaking of reserves, I limit myself entirely to the term in its most rigid acceptation, as prescribed, in fact, by the forest conservancy rules on the subject, I agree, however, with Mr. Davis, that it is desirable to prevent any timber cutting in places where valuable timber still exists. A separate proposal on this head will hereafter be submitted.

54. "Having determined that in this district facilities for the introduction of the reserve system do not exist, it next remains to be considered what measures should be taken to regulate and perpetuate the supply of timber from the tracts, Mr. Davis estimates the annual present requirements of Chittagong in regard to timber to be 2,500 tons. It would have been instructive had a comparative return been submitted, showing how this result was arrived at. I have requested Mr. Davis to remedy this omission.

55. "It is interesting to note, however, that a large increase has taken place this year as compared with last, in the number of timber logs brought to market, while a corresponding decrease is shown in planks and beams sawn and cut in the jungles. The inference to be drawn from this is, that the timber has been cut mostly in such remote and difficult places as to render the conveyance thereof by water safer and more convenient as logs, rather than in the shape of planks, and that the supply of timber in places easy of access is, therefore, perceptibly diminishing.

56. "Supposing the estimate of consumption as above given to be correct, and granting that we prohibit all timber felling in the yet unexhausted forests of the district, there is every reason to suppose that the present rate of supply cannot be much longer continued, while on the other hand, the measures taken to ensure a future and permanent supply of timber by planting is necessarily a remote and far distant panacea for an actual and fast approaching difficulty; whether or no, under these circumstances, it would be wise to limit timber cutting in the hills, that is to prevent *alt* felling of timber after such period annually when a certain specified amount had been cut and brought out, and by such prohibition to cause a rise in Chittagong market prices, and so stimulate the importation of wood from Arracan and elsewhere, seems to me to be a question which could most fitly be referred for an authoritative opinion to the head of the forest department, the professional adviser of Government in such matters. From the present state of affairs one conclusion at least seems to me absolutely and clearly deducible. It behoves us to expend a very much larger sum than we have hitherto done in planting seedlings and providing for future supply."

57. Next comes the subject of plantations. During the first year of plantation, two plans were tried. One plan was to give seeds to joomeahs in the hill tracts. This was done by the Assistant Conservator in concert with the Deputy Commissioner, and at the time the seed was distributed, a bonus of Rs. 5 per seer was given with the seed, and the joomeahs were further given to understand, that when the seed came up, they would be paid a fair rate per hundred for all the plants they could raise, and if the seed did not come up they would not be called upon to refund the money they had received, nor would they be held in any way responsible for the future. Thus encouraged, they readily took the seeds and money, and it

was only reasonable to expect some return; but out of 25 seers comprising about 38,000 seeds, only 37 plants came up, showing beyond a doubt that this method was at fault. The other plan was to open a small nursery by Bengalee daily laborers, and as soon as the seedlings came up to transplant them. The small nursery that was formed measured about 30 square feet, and in it the seeds came up profusely, and were transplanted as soon as high enough. Of these 240 are living.

58. The operations of the last year have been thus described by the Assistant Conservator. "During the past year eight acres were planted at Sitapahar, and five acres at Pahartallee near the station of Chittagong. A few seeds were likewise sown near Kassalong.

59. "The plan of sowing five seeds at each stake was tried, and in addition small nurseries were opened, but strange to say, very few of the seeds at stake came up compared with those put into the nurseries.

60. "The result of the last counting show 2,130 seedlings to be standing on the Sitapahar site, and 1,129 at Pahartallee, whilst out of 200 seeds not one has come up at Kassalong, but this I am not surprised at, as they were put in at stake, and for some reason the seed will not germinate when so sown. Most probably the soft earth in the thullas retains the water, which cannot escape through the hard sides of the holes, and thus rots the seed. The seedlings average one foot in height, and are at present going through the most trying weather, a little rain would do them a deal of good.

61. "The great and I may say the only drawback to extensive plantations is, that we cannot rely on getting seed from Burmah delivered in time. Last year the seed arrived in the middle of May, and as it takes fully one month for it to germinate, and another month before it is fit to transplant, it is the middle or end of July before the transplants are fairly in the ground, and then they have hardly time to settle and throw out new leaves before the rains cease and they have to struggle through the ensuing drought, which in many cases cripples or kills them."

62. The Assistant Conservator describes the operations of the current year as follows: "This year the land between the Holingamara hill and the Kaptie has been selected and about one hundred acres prepared. Nurseries for about ten maunds of seeds are being dug and are nearly ready. I may say they would have been ready long ago, but the delay caused by the seed not having arrived from Burmah, which, though written for and remitted against in December, and promised in February, has not yet arrived, and I have had purposely to delay the nurseries in order to avoid having to dig them again.

63. "It is proposed this year to put in a small crop of cotton with the teak as a means of reducing the cost of planting. The measure has to be on a limited scale to guard against the possibility of not getting sufficient labor, and if found to answer this year, it may be the means of our eventually getting the hillmen to plant regularly with their jooms.

64. "It is likewise intended to fill up all vacancies in last year's plantation, and for this purpose suitable nurseries have been prepared in both localities."

65. Regarding the yield of the forests, it has been reported that 1,056 tons of timber in logs have been brought out of the forests against 433 tons during the previous year, showing an increase of 623 tons. In boats 1,089 tons against 244 tons during the preceding year, likewise shows an increase of 845 tons, whilst in beams and planks the outturn of the year of report is only 19 tons, against 841 tons in the previous year, exhibiting a decrease of 822 tons. The total yield of timber from the Government forests this year is 2,164 tons against 1,518 tons of the previous year.

66. There is likewise an increase in the quantities of all kinds of minor forest produce, including house-posts and saplings, which have risen from 8,306 last year to 9,321 this year

67. The Assistant Conservator desires to include krug, and patti leaves, and gurjun oil in the list of taxable articles. The Deputy Commissioner is, however, not prepared to support the addition of any fresh articles of taxable forest produce to the schedule already prescribed, as the system at present prevailing of granting leases of the forest products of specified tracts of land, already realizes or should realize the Government dues on the articles in question.

68. Mr. Davis says, that the practice of taking tolls on the forest produce brought down the different rivers is by far the most practicable and economical means of realizing revenue. He adds "during the last two months, in addition to the original toll station, Collectors have been appointed on commission to collect tolls on the following small streams, viz, Sutu, Droong, Kallapanca, Issamuttee, Shilok, Doloo, Hunger, and Tankwattee. It is likewise proposed to adopt the same course on the Eadgong, Rezoo, and Naaf, but suitable and reliable agents have not yet presented themselves as candidates."

69. The Deputy Commissioner is much averse to this supplementary plan. He is of opinion that the collecting of any tax "on commission" cannot fail to be the cause of great inconvenience and grinding oppression to the people at large, unless the Collectors are men of well-known probity and position, and even then the Deputy Commissioner would regard this mode of collection as a "*pis aller*" an alternative only to be resorted to when all other means failed.

70. I am not disposed to attach much weight to the objections raised by the Deputy Commissioner. They would be equally valid if raised in connection with every system of collections on which native agency has to be employed. The Deputy Commissioner

apparently forgets that the system he inveighs against is very much in vogue in the management of our khas mehals, and has not been found in practice to be attended with the "grinding oppression and inconvenience" that he apprehends.

71. It is in fact the best and readiest means of ascertaining the amount and value of any particular trade or traffic, and in this veiw I propose to continue the system for the present year. Care, of course, is necessary in the selection of agents or tehsildars, the importance of which the Assistant Conservator appears fully alive to. The Mong Rajah has been appointed to collect on the Surta, Halda, and Kalapanea, a nominee of the Mong Rajah, for whom the latter is surety, has been appointed for the Doloo, Hunger, and Tankwattee, whilst for the Silok and the Issamuttee no satisfactory arrangements have as yet been made.

72. *General Remarks.*—The working of the division shows a surplus of Rs. 45,429-11 as will be seen from the following calculations—

	Rs.	A.	P.
Receipts	61,309	11	0
Deduct collections on account of previous years ...	5,684	14	0
Total ...	55,624	13	0
Expenditure during the year	10,195	2	0
Balance ...	45,429	11	0

73. Mr. Davies reports that the collections would probably have been larger had the permit fees been allowed to remain in force. Mr. Davies informs me that these permit fees have, however, since been revived.

74. The Assistant Conservator of Forests has made the following general remarks :— "We have now arrived at a fair knowledge of what we possess in the shape of forests, and with the exception of the Fenny and Lushai country we know exactly what we have left, and it remains now to be decided what course should be adopted as the most suitable to the people, country and the interests of both. We have an enormous demand on our forests both for timber and other forest produce, and we must make our existing stock last as long as it can with as little hardship as possible to the inhabitants, both of the hills and the adjoining districts I have shown what my views are with regard to the forests, and it remains to be decided what action should be taken.

75. "We are as yet without any rules or regulation of any kind. It is only reasonable to ask for rules that can really be of service. One code for a whole province is, I submit, detrimental to the working of all divisions, save the one it was drawn out to suit. The country products and people in this division are vastly different to any other and require special rules and an entirely different system of working as regards details, though the great aim and objects of the whole undertaking are identical.

76. "What we require at present are effective rules for the better management of the tolls, with power to regulate the size and quantity of timber to be felled in any fixed locality, as also rules for the protection of plantation from cattle trespass.

77. "The whole matter of rules is dependant on the action, taken with regard to reserves, and, therefore, until definite orders are passed on that subject, it would be premature to prescribe rules.

78. "Of the establishment under me, I have only to say that, I have had opportunities of watching the working of the Chandergonah toll station the largest of the stations, and I am satisfied that very little if any malpractice is carried on. There may be a little petty larceny, which is difficult to detect, but I do not think more than would exist under the best paid and supervised staff."

79. The Deputy Commissioner observes, "the working of the division from a financial point of view is most satisfactory. From an administrative point of view, however, I regret to state that the aspect of affairs does not seem to me altogether bright. As I have previously pointed out in this letter, we are making a great money profit now at the expense of the future, and I would prefer to see the receipts less and the expenditure in reproductive works and duties of supervision more."

80. Captain Lewin is evidently unaware of the state of affairs in the current year, and of the progress that is taking place in the matter of plantations. A sum of Rs. 6,000 has been sanctioned for expenditure under this head during the current year, whereas in no previous year has the sanction exceeded Rs. 1,000. By way of illustration, I may mention that, whereas 13 acres were planted out last year, the area planted out during the current year will probably exceed 100 acres. Besides which the vacancies in last year's plantations will be filled up. In conclusion I have to recommend for the present year a policy of complete inaction. I recommend that nothing whatever be done, but that we rest on our oars and watch the working of the department for another year. So far it is working smoothly, prosperously, and well, and in recommending inaction, I am simply advocating leaving well alone.

81 I agree entirely with the views of both the Assistant Conservator and the Deputy Commissioner regarding the inadvisability of forming reserves. The forests of the district are too scattered in the first place to make it worth the heavy expense that would have to be incurred. From the nature of the country and the climate, the rules would be extremely difficult to work, and lastly, before coming to any final determination, I should deem it advisable to get more extensive and detailed local information.

82. On this latter head much has been done during the year of report by Mr. Davis, but the stock of local knowledge is yet far from being exhausted, and, therefore, before making any substantive recommendation I should prefer to increase it. Before action knowledge. Meanwhile I am strongly opposed to the policy of forming any reserves at all.

If this be decided on, there will be nó occasion for the rules referred to by Mr. Davis in paragraphs 75-77 of this report as being of pressing necessity. Should any occassion arise for any instructions in dealing with the tolls, the matter will, of course, be duly considered whenever raised.

83. I am glad to be able to report favorably regarding Mr. Davis's conduct and qualifications. He has given me complete satisfaction in the discharge of his duties, and I consider him an intelligent, hard-working, and zealous officer, well suited for the department in which he is employed.

RESOLUTION.

AGRICULTURAL DEPARTMENT.

FORESTS.

Calcutta, the 5th March 1874.

READ—

THE progress report of the Forest Administration of Bengal for the year 1872-73.

THE operations of the Forest Department are still limited to the tracts of country mentioned in last year's report. The system of administration has, however, undergone certain changes. The forests in Chittagong, as in Assam in the previous year, have been placed under the control of the Commissioner of the division under whose control the Assistant Conservator performs his duties of inspection, settlements, survey, collection of revenue, and the decision of disputes.

2. During the year Dr. Schlich was appointed Conservator of Forests, and has visited and reported upon the principal forest tracts, and occupied himself in conferring with the local officers, in organising establishments, and in framing rules.

3. The parts visited were the Sikkim, Western Dooars, Assam, Patna, and Chota Nagpore forests. Besides these explorations, inspection work was carried on by the Deputy and Assistant Conservators in the Jynteah Hills, Kamroop, and other parts of Assam; in the Sunderbuns, and in the forests bordering the principal rivers in Chittagong.

4. The result of Dr. Schlich's explorations will form valuable groundwork for forest administration in future years. He has gathered detailed information regarding the constitution of each tract, classifying the different descriptions of forests, and arranging the trees in species. The following distribution of forests was found—

(1.) *Sâl forest*, found in Sikkim on the lower hills up to 3,000 feet, and in the adjoining plains running through the Western and Eastern Dooars; also in the Kamroop, Nowgong, and Durrung districts, and in the lower portion of the Garo and Khasi Hills; but most abundant all over Chota Nagpore.

(2.) *Khair and Sissu*, which usually appear together, found along the banks of watercourses in the Sikkim Terai and Western Dooars.

(3.) *Mixed plain*, comprising the forests in which neither of the above-mentioned trees prevail sufficiently to classify them accordingly, found in Sikkim and in Assam, where it extends in evergreen patches of greater or lesser extent, north and south of the Brahmaputra through the districts of Kamroop, Durrung, Luckimpore, and Seebsaugor.

(4.) *Savannah forest*, or grassy areas, with and without trees, found in Sikkim, Western Dooars, and in Assam, and occupying the space between the Brahmaputra and the mixed plain forest.

(5.) *Upper hill forest*, in Sikkim, Assam and Palamow, being the temperate forests, productive of oaks, magnolias, chesnut, walnut, lali, and maple. In the Khasi Hills these forests are in patches only, near watercourses or springs. They are well stocked, but the trees are inferior to those in Sikkim.

(6.) *Lower hill forest*, occupying the tracts between the plain and upper hill forests, and producing the trees of both. The trees, however, attain a finer shape than in mixed plain forest, and chiefly consist of sâl, sam, nahor, poma, and tita sappa. The one distinguishing characteristic of these forests from the mixed plain is that the former are rich in bamboos. These tracts are to be found around Buxa in the Western Dooars, where they are well timbered; in Palamow and in the lower slopes up to 3,000 feet of the Garo, Khasi, and Naga Hills. The Lieutenant-Governor agrees with the Conservator's remarks on the necessity

of preserving these forests, in view of the important part they play in the regulation of moisture and the prevention of landslips, and will be prepared to consider favorably any suggestion the Conservator may make to that end.

(7.) *Pine tree forest* in the Khasi and Western Naga Hills, between 2,400 and 6,000 feet.

(8.) *Soom forest* is found in Assam and is exactly the same as mixed plain forest, with the addition of soom, and, like it, is generally well stocked.

5. Besides attempting the above classification, Dr. Schlich has also commenced the division of the trees into species, but the task is as yet incomplete.

Area.

6. In the Resolution on last year's report the Conservator was asked to state the area of Government forest in each forest district, and the rules under which those areas are administered. At the close of the year the area of reserved forest stood thus,—of which 214 square miles have been added during the year—

	Square miles.
Sikkim	106
Kamroop	38½
Nowgong	75¾
Seebsaugor and Naga Hills	100
Total ...	320¼

For want of data the area of unreserved forests in the forest divisions which have already been established (Cooch Behar, Assam, Dacca, and Chittagong) can only be given by a rough estimation, at 15,000 square miles, exclusive of the forests of the Khasi and Jynteah Hills. The above figures form but a small portion of the total forest area in Bengal, which is roughly stated at 59,225 square miles The countries richest in forests are Assam, the Sunderbuns, and Palamow. In Assam 92 per cent., and in Palamow 85 per cent. of the total area are chiefly forest; while the luxuriant growth of the Sunderbuns covers an area of 3,108 square miles, consisting of dense and impenetrable under-growth of goran, from 6 to 12 feet high, mixed with seedlings and saplings of larger trees, and a more or less thick growth of mature trees, the whole being frequently choked up with heavy creepers of a girth of 10 to 15 inches, which crush down the young trees on which they rest.

Forest reserves.

7. Some progress has been made during the year in the selection, demarcation, and mapping of reserves in Assam and Cooch Behar. 214 square miles have been added to the reserved tracts, and 342½ square miles were selected, besides what had been notified as reserved in the *Gazette*. A reserve examined in the Darjeeling Terai, with outlets for timber in the Mahanuddy and Teesta rivers, was found to contain 8,404 acres, consisting of sâl, chalownee, saj, sitsal, toon, sissu, khair, katoos and India-rubber, sâl trees being the most numerous. In the Western Dooars a reserve of 4,468 acres of sâl, sissu, and khair forest was surveyed and mapped. In Kamroop and Nowgong five lowland reserves, aggregating 49 square miles, have been demarcated, containing sâl, with a little poma and sam. On the Mikkir Hills, above Nowgong, has been demarcated a dense forest of the regular Assam trees, such as the nahor, the poma, sam, and jamu, &c. On the confines of the Naga Hills and Seebsaugor, the Nambor reserve of 100 square miles has been demarcated, containing mixed, plain, and hill forest. In the Luckimpore district, nine-tenths of which is forest, no reserves have been made. Care has been taken that the establishment of these reserves shall not trench upon the rights of the surrounding villages, who have always taken, without hindrance, any forest produce they required for domestic use, and for whom there are all over Assam very ample supplies in the Government open forests. Regarding the question of forming reserves in Chittagong, His Honor, though not prepared to agree with his views, has perused the remarks of Mr. Davies with much interest. He would prefer to leave the question open until our stock of local knowledge is increased in the direction indicated by the Conservator.

Protection and improvement of forests.

8. The description by the Conservator of the devastation and waste going on without restriction from firing, cutting, jooming and other causes in the sâl and pine forests of Assam, and in the sâl and lower mixed forests of Chota Nagpore, and the account which Mr. Davies gives of the manner in which the Chittagong forests are denuded by unlimited cutting and jooming, show the necessity which exists for a careful protection of those forest tracts which it is decided to preserve; but unfortunately owing to the mischief being so widespread, a specific remedy cannot be provided without extensive preventive measures, involving a considerable increase to the forest establishments, and probably a good deal of harassment to the people.

According to the Conservator, the division in which measures are most needed to prevent a dearth of fuel and timber for local purposes is Patna. There, not only a scarcity of wood-fuel exists, but also a difficulty in obtaining land for forest purposes. Regarding the insufficiency of the wood-supply the Conservator writes thus :—" At present this state of things does not indicate a hardship, as over the greater portion of the area dried cow-refuse is the material principally used, and as the custom of burning cow-refuse is very old, and the people seem to prefer it to wood; indeed the Conservator has seen the former used in localities where wood fuel was to be had within a few hundred yards. Another question, however, is whether it will not become a hardship. Agriculture is progressing, and the failure of the opium crops has of late called for a searching investigation as to its causes. If it should be found that one of them is the exhaustion of the ground, cow-refuse will have to be applied to its legitimate use to manure, and the want of fuel will then be deeply felt. But, even apart from the opium question, the time will come when cow-dung will be used for the manuring of all lands under cultivation, and the question of providing fuel will have to be considered."

Plantations.

9. Eighty-nine acres were added to the plantations in 1872-73, and Rs. 16,200 were expended within the year. At the end of the year the area stood thus :—

	Acres.
Cooch Behar	563
Assam	17
Chittagong	13
Total	593

Two important points specially referred to in the Lieutenant-Governor's Resolution on the last year's report, have received the close attention of the Conservator, namely, whether sâl and teak can be made to grow large in parts of Bengal. To solve the first question Dr. Schlich visited the Chota Nagpore plateau, and reports the sâl forests there to consist of shoots from old stumps which are constantly cut over as soon as they are fit for local purposes; the people burning almost nothing but young sâl shoots a few inches in circumference. Even in places where the trees had reached a larger girth, and gave promise of further growth, they generally, Dr. Schlich states, fall under the axe before they attain a girth of three feet. He had, however, come across a small number of really large trees, proving what excellent timber may be produced if certain trees are protected against cutting; and he instances a small patch, which contained 36 well-grown trees, with an average of 46 cubic feet of timber a-piece, and other isolated trees of 6 feet girth. His view is that it rests entirely with us to produce large sâl timber in the Hazareebaugh district.

The teak question does not admit of so easy a solution. Two small experimental plantations in the Dooars have been unsuccessful. The Bamunpokree spur in Sikkim is, however, so far doing well; it was begun in 1868, and in the successful part of the plantation the young trees are healthy.

Sundry useful reforms have been effected in the management of the plantation, which is now being extended as rapidly as means permit. There

have been, however, sickly signs in several of our young teak plantations, which have caused some uneasiness to the Conservator.

The Conservator reported also specially upon the planted teak of the Patna division. He observed and measured some 27 large teak trees in the districts of Patna, Shahabad, and Gya; he believed them to be about 70 years of age; he found their average yield to be 24½ cubic feet.

Dr. Schlich also gives some very interesting information as to the progress and condition of the teak forests in Assam, and sums up his conclusions as follows:—"Teak of inferior and moderate quality can be produced in the Bengal plains, Behar, and in Lower Assam, but there is no proof as yet to show that superior teak can be produced in the Sikkim Terai or in Lower Assam, and in Upper Assam it appeared doubtful whether it will thrive at all."

The Lieutenant-Governor has directed that the Kulsee plantations in Lower Assam be extended as rapidly as possible, and that a part of the plantation be laid down with the more valuable timber trees, namely toon, sam, and sissoo.

Mahogany.

10. This tree grows well in Calcutta; there are also fine specimens on the road-side at Titaliah, and in different other localities, so that there is reason to believe it can be successfully cultivated in the Bengal plains, but whether it will thrive in Assam appears doubtful. Seed is chiefly obtained from Jamaica, but it stands carriage so badly that the only hope of raising large plantations of it, is to find out some locality in India where it will seed freely. With this view a large quantity of young plants has been lately distributed for plantation to jail gardens. However, there is some prospect of the trees about Calcutta seeding freely in the course of a few years. In 1872, nearly 2,000 were raised from seed produce at Calcutta and Barrackpore, and about 500 seeds have been obtained later.

Caoutchouc.

11. Caoutchouc forests have not been specially classed, because the India-rubber trees are not found in groups, but are scattered in single trees over nearly all the forests, the best localities possessing scarcely more than 20 trees per square mile, and the greater portion of the forests much less. They grow in all parts of Bengal, but luxuriantly only in the moist forests along the foot of the hills in Sikkim, Bhútan, Assam, Cachar, Munipore, Lushai country, and most likely Chittagong. The caoutchouc tree is also found in Burmah; but the most favorable province is Assam, especially the dense evergreen damp forests near the foot of the Himalayas in the Luckimpore and Naga Hill districts. Up to the present only small experimental plantations have been made, but a plan of establishing them on a large scale is under discussion, and the Lieutenant-Governor has expresed his opinion that the most valuable and most paying forest operations we can undertake in Assam, will be the preparation of considerable areas of rubber plantation. Dr. Schlich estimates the rubber exports from Assam to have amounted of late to—

7,500	maunds in	1870.
12,000	„	1871.
21,000	„	1872.
11,000	„	1873.

The falling off in the last year was due to the closure of the rubber forests of Luckimpore, mainly with the view of preventing frontier complications. The value of this trade must be great, inasmuch as the price of rubber in Calcutta ranges from Rs. 45 to Rs. 80 per maund. The importance of a due administration of the rubber revenue may be estimated from the fact that a European dealer in Assam offered to pay one lakh a year for the monopoly of rubber in all the Luckimpore forests for three years. The Government could not accept the offer because its acceptance would involve the lessees' having direct relations with the border tribes who usually bring rubber into the market. The Commissioner of Assam has proposed to establish a Government monopoly of rubber, whereby a Government officer shall buy all rubber brought into depôt, and sell it periodically by auction or otherwise, and the proposal has been approved, but the details of its working

have not yet been settled. The Darjeeling and Cachar forests also yield a considerable amount of rubber, the estimated yield of the former being about 700 maunds a year. The Darjeeling rubber was for one year collected by the Forest Department itself, and the rubber brought to Calcutta was so much purer and cleaner than ordinary rubber that it fetched nearly 40 per cent. more than the ordinary market price. In September 1872, the Deputy Commissioner of Darjeeling sold the right to collect on the left bank of the Teesta for Rs. 3,400, leaving to the Forest Department only the right bank of the Teesta. The result is, that the collections of the present year amount to 57 maunds only, and the cost of collection has risen to Rs. 16 per maund. The fact of the collections being made by two different parties multiplied opportunities for theft. In future the whole rubber of the Government forests in Darjeeling will be collected through the Forest Department, and it is expected that Rs. 12,000 will be realised therefrom. For Cachar no plan for working the rubber forest has yet been framed. But wherever rubber is collected under the Forest Department, every effort must be made to regulate the process, and so to restrict the tapping as to spare the lives of the trees, and give each tree a period of rest, and also so as to keep the juice clear of impurities, and to prepare it in the best way on the spot. Whatever may be done the difficulty will always remain that India-rubber trees are scattered over the forests at long intervals; and until we have regular plantations of rubber trees, economical collection of juice on the most approved system will not be possible. It is hoped, therefore, that plantations of the different caoutchouc-yielding trees will soon be formed.

Timber operations.

12. Little or no fresh felling has been done, the operations of the department having been confined to bringing out of the forests the timber cut in previous years, and to selling off deteriorated old stock. The sales of Darjeeling timber comprised 1,096 sâl logs, 200 logs of temperate trees, 6 sleepers, and 288 planks and scantlings, leaving the large number of 31,660 pieces still to be disposed of, lying partly in depôts and partly scattered about the forests. The prices fetched were extremely small, barely $1\frac{1}{2}$ annas per cubic foot, and did not cover the cost of carriage; yet the logs of the temperate forests were of the best class of trees, namely magnolia, chestnut, and oak. The dealers, it is said, much prefer to buy standing trees, which they can fell and square for themselves, and have combined to obtain the timber below the real value. The prices, however, improved at the later monthly auctions, which must be continued, as the timber felled some years ago is fast spoiling in the forest, and it will be advisable to stop the sale of standing timber until the material in the depôts has been disposed of. The auction sales of sâl logs in the Dooar forests were more successful, the timber fetching $11\frac{1}{4}$ annas, and yielding a net surplus of $3\frac{1}{4}$ annas per cubic foot. The sâl sales in Lower Assam, though on a small scale, were also a success, 50 logs being sold at the rate of 15 annas per cubic foot, yielding a net surplus of $6\frac{1}{8}$ annas per cubic foot. The experiment was concluded of floating down the river a certain number of logs cut some years ago in the evergreen forests of Upper Assam, and 474 logs thus brought into the market were sold, including nahor, ajhar, and others of the best timbers of the hill forests. On this transaction there was a loss of Rs. 2,839, and Dr. Schlich reports that in Assam "the price of timber, other than sâl, is too low to make the working by departmental agency remunerative."

Private timber operations.

13. There is no accurate record of the timber cut for private purposes under permits except for the Cooch Behar Division, where 5,228 pieces were cut, in which a revenue of Rs. 6,714 was realised. About 250 logs of magnolia, chestnut, chalownee, and toon, cut in the Darjeeling forests under permit, yielded a revenue averaging over Rs. 10 per log. In the Dooars the revenue averaged under 12 annas per tree felled under permit. The timber taken out of the Chittagong forests under permits came to 2,164 tons, as against 1,578 tons in the preceding year; but in these forests the permit-holders cut where and how they like, whereas in the Darjeeling forests they can only cut under the restrictions and supervision of the Forest Department.

Financial results of the year.

14. The totals of receipts and expenditurewere as follows :—

Receipts.	Rs.
Sale of timber brought to depôt by Government agency ...	24,845
Sale of fire-wood and charcoal removed by purchasers ...	6,504
Permit fees, rent from squatters, &c., (includes civil officers' collections)	1,09,333
Grazing dues and fisheries...	710
Sales of fruits, babool-pods, India-rubber, &c.	8,233
Fines and forfeitures	79
Miscellaneous receipts	146
Total for 1872-73 ...	1,49,851
Total for 1871-72 ...	1,39,089
Expenditure.	
Conservancy and working	28,526
Establishments, &c.	71,090
Total for 1872-73 ...	99,616
Total for 1871-72 ...	1,08,339

This shows a small surplus, but in fact the largest item of revenue is Rs. 61,400, the yield of the tolls on the Chittagong rivers, and much of the forest revenue of Bengal is raised by the ordinary revenue officers without the co-operation of the Forest Department, so that the Department itself so far worked at a loss. The receipts of the Cooch Behar Division are expected to rise.

15. Forest administration, though still in its infancy, has made some advance, and the Lieutenant-Governor observes with satisfaction the interest displayed in their work by the forest officers, and acknowledges with thanks the care and ability with which Dr. Schlich has administered the Department.

By order of the Lieutenant-Governor of Bengal,

H. L. DAMPIER,

Secretary to the Govt. of Bengal.

No. 681.

COPY forwarded to the Conservator of Forests.

No. 682.

COPY with 350 copies of the report, submitted to the Government of India, Agricultural Department.

No. 683.

COPY with copy of the report, forwarded to the Commissioners of Cooch Behar, Chittagong, Dacca, Chota Nagpore, and Bhaugulpore; also to the Collectors or Deputy Commissioners of each district of the Cooch Behar and Chota Nagpore Divisions and of the Sonthal Pergunnahs.

No. 684.

COPY, with copy of the report, forwarded to the Secretary to the Chief Commissioner of Assam for information.

By order of the Lieutenant-Governor of Bengal,

H. L. DAMPIER,

Secretary to the Govt. of Bengal.

CALCUTTA,
The 5th March 1874.

PROGRESS REPORT

FOREST ADMINISTRATION

IN THE

LOWER PROVINCES OF BENGAL

FOR THE YEAR

1873-74.

BY

W. SCHLICH, PH.D.,

Conservator of Forests, Bengal.

Calcutta:

PRINTED AT THE BENGAL SECRETARIAT PRESS.

1874.

No. 128C, dated Darjeeling, the 1st September 1874.

From—Dr. W. Schlich, Conservator of Forests, Bengal,

To—The Secretary to the Government of Bengal, Agriculture Department, Forests.

I have the honor to submit the annual administration report of this Department for the year 1873-74.

2. The report of the Chittagong Division has been entirely incorporated in my report, so that it need not be printed separately. The report of the Assam Division, I beg, may be printed separately, as the Chief Commissioner desires to be furnished with 50 copies.

3. With last year's report I submitted a map of the Mahanuddy terai range, which was published. This year I have eight maps of a similar description before me, which of course cannot be published; but I append them for His Honor the Lieutenant-Governor's inspection, with the request that they may be returned. There is, however, a map of the Bamunpokri plantation attached to Appendix IX which I should be very glad to see published, as it illustrates the formation of blocks and compartments in plantation tracts.

4. The divisional reports of Chittagong and Assam are appended.

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Appendix I.—Form I.—List of trees, shrubs, &c., observed in the eastern Sunderbuns, by A. L. Home, Esq., Deputy Conservator of Forests, Bengal.
„ II.—Statement showing results of forest valuation survey of the eastern Sunderbuns (sundree, timber forests).
„ III.—Form I.—List of trees observed in the Garo Hills, Manda valley, by Dr. W. Schlich, Conservator of Forests, Bengal.
„ IV.—General description of the Sivok Hill Range, by J. S. Gamble, Esq., B.A., Assistant Conservator of Forests, Cooch Behar Division.
„ V.—Form II.—Statement showing the results of forest valuation surveys in the Sivok Hill range. Area of lower hill forest 7,328 acres (total area of range, 10,240).
„ VI.—Form I.—Statement showing the result of forest valuation surveys in the Mooraghat Sâl forest. Area of sâl tracts valued, 2,992 acres. (Total area of reserve, 7,680 acres.)
„ VII.—Form I.—Statement showing the results of forest valuation surveys in the Dainah Sissu forest.
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PROGRESS REPORT

OF

FOREST ADMINISTRATION IN BENGAL

For the Year 1873-74.

By W. SCHLICH, Ph.D.,

Conservator of Forests, Bengal.

INTRODUCTORY.

1. The year 1873-74 has again brought a great change to the Bengal Forest Department in consequence of the formation of the Assam Chief Commissionership. The Department was first established ten years ago by declaring certain tracts in the Darjeeling district Government reserved forests, the control of which was entrusted to the Superintendent of the Botanical Gardens at Calcutta, who shortly afterwards extended operations to the Western Dooars. Towards the end of 1867 a separate Conservator of Forests was appointed, who extended forest operations gradually over the Eastern Dooars, Goalparah district, which, with the Darjeeling and the Western Dooars subdivisions, ultimately formed the Cooch Behar Forest division. He next commenced operations in Assam as a second division, then in Chittagong as third, Bhagulpore the fourth, and Dacca the fifth division.

2. The above extension of operations was carried out without the staff necessary to do the work of the department effectually, and the consequence was that considerable changes were introduced in 1872. The forest officers in Assam were posted under the orders of the Commissioner of the division, the Conservator being only advising officer and controller of accounts. In Chittagong the Commissioner was made Conservator of Forests, whereas the duties of the Conservator of Forests, Bengal, dwindled down to those of a controller of accounts and adviser to the Government of Bengal, if called upon. Towards the end of 1872 the Dacca and Bhagulpore divisions were closed for a time, and the staff made available was thrown into the Cooch Behar and Assam divisions with the view of doing the work in these at least in an efficient and satisfactory manner.

3. The Department having been consolidated in Cooch Behar, Assam, and Chittagong, was on the point of expanding again and reassuming the work in Dacca and Bhagulpore, when towards the close of 1873-74 Assam, including the Goalpara, Cachar, and Sylhet districts, was formed into a separate administration, thus reducing the Bengal Forest Department to two divisions, Cooch Behar and Chittagong. However steps have been taken, and an establishment sanctioned, to bring 178 square miles of forests in the Palamow sub-district, Chota Nagpore division, under control and management. Moreover there is a prospect of the Sunderbuns forests being brought under this Department, and there are forests in the Bogra Collectorate waiting to be examined; so that the end of the year 1874-75 may find the Department grown again as much as the

cutting off of Assam had temporarily reduced it. In a financial point of view the change will not be a loss to this Department, since Assam has always shown a considerable annual deficit.

4. The present report for Bengal will be the last that deals with Assam, and the returns have been so arranged as to give first separately the data of the divisions which remain with Bengal, then those of Assam, and then the total.

SECTION 1.—INSPECTION OF FORESTS.

5. Owing to the fact that forest operations in Bengal have been extended over a small portion of the total area as yet, it will be necessary to keep up this heading for a number of years to come, until the preliminary inspection and examination of all forest tracts worth and advisable to take under proper management, have been completed.

COOCH BEHAR DIVISION.

DUMSONG, DARJEELING DISTRICT.

6. When the present reserves west of the Teesta were set aside for forest purposes in 1865, it was also said that all the sâl containing slopes east of the Teesta, in the so called Dumsong sub-district, up to an elevation of 3,000 feet, should be considered reserved forests. However, the tracts indicated in this peculiar manner have never been taken under management, and it has been arranged between the Deputy Commissioner of the district and the Conservator of Forests that the tracts to be reserved shall be marked off during the coming cold season.

7. The Conservator of Forests made a rapid tour through the Dumsong sub-district in October 1873, marching from the Teesta cane bridge to Kalimbong, Dumsong, Petong, Laba, Ambiok, close to the former fort of Daling, and thence down the Richu nuddy into the Western Dooars. Dumsong, as is well known, consists of ranges of hills interrupted by an endless number of water-courses, comprising an area of 485 square miles. The highest hill reaches an elevation of 10,364 feet. The vegetation resembles that of the Darjeeling hill territory, namely lower hill forests up to an elevation of about 3,000 feet, upper hill or temperate forest above 5,000 feet, and the two running into each other between 3,000 and 5,000 feet. The lower hill forest contains sâl (*shorea robusta*) and saj, two species of terminalia on the slopes towards the Teesta in good quantities, but very little on those towards the Western Dooars. India rubber (*ficus elastica*) is scattered in single trees near water-courses. The temperate forests are poor in magnolias, the best of the hill timbers, but they are rich in birch (*betula sp.*), chestnuts (*castanopsis sp.*), Engelhardtia, and also in oaks. With the exception of the slopes towards the Teesta and towards the Western Dooars, the forests are inferior in growth to those of the Darjeeling hills, the trees reaching neither the same height nor girth. In the western and northern parts of Dumsong joom cultivation has rapidly increased of late years, and no time must be lost in saving a sufficient area of forest from destruction. There is no or very little cultivation in the eastern and south-eastern parts.

SUNDERBUNS.

8. The examination of the Sunderbuns, which was commenced in 1872-73, has been completed during the year by Mr. A. L. Home, Deputy Conservator of Forests. The tracts examined in a summary manner during the year cover an area of 1,083 square miles, all situated in the Jessore district. They are bounded on the north by allotments leased out; on the south by the Bay of Bengal; on the west by the Shakbaria river, the Casitani, Cheilka, and Sunamuki khals, and the Morgul river; on the east by the Bhola and Huringottah rivers.

9. Regarding the constitution of the forests, Mr. Home reports as follows:—

"The forests are situated on numerous islands of various sizes divided off by large and small rivers, all affected by the tides and containing brackish water unfit for drinking purposes. The level of the islands is generally from one to two feet above high-water mark, and the forests are inundated only on the occasion of spring or other exceptionally high tides. The chief rivers traversing the tracts are—

"1*st*. The Shakbaria, on the west, which, joining with the Calputtua, becomes the Arpungasi river lower down.

"2*nd*. The Sipsah and Buddur, which unite and form the Morzal or Murjattah river to the south.

"3*rd*. The Pussur river, which runs from north to south through the whole tract.

"4*th*. The Bhola and Huringottah rivers, which form the eastern boundary.

"These main rivers are all connected one with the other within the tract by numbers of smaller channels, thus forming the islands on which the forests stand.

10. "The soil is composed of sand mixed with a large amount of decomposed vegetable matter. It dries very hard on the higher parts of the islands, and where the ground is low remains in a soft boggy state, into which a man sinks from one to two feet; the mire below the surface being of a dark colour and giving forth a decidedly offensive odour. The climate is comparatively good from the end of November to March, though during the whole year the tract is very unhealthy, fevers being always prevalent among the men employed in the forests. Heavy storms pass over the islands during the monsoons, when the forests are practically closed owing to the danger of navigation for native craft.

11. "The general outward appearance of the forests is a growth of bani with golpatta and hartal, which here attains a height of 15 to 20 feet, and keah, along the water-edge on shelving banks; and on steeper banks recently cut away by the action of the current sundri stands out occasionally pure, but as a rule mixed with a small percentage of gengwa, shingr, or nutmi. The islands are all covered with dense forest growth, and the outer edge once penetrated sundri is everywhere the prevailing tree, the under growth consisting of sundri seedlings, generally so densely packed on the drier ground that it is impossible to avoid trampling them under foot, and always very numerous, mixed with those of either of the above noted trees. The exceptions to this are in the north-eastern portion of the tract, lots Nos. 241 and 244, where cane-brake covers part of the ground, as it does also a great part of the leased allotments Nos. 239 and 240, the remaining area being sundri forest, and in the southern most portion, where gengwa outnumbers the sundri. It is evident that sundri does not arrive at perfection where the soil is penetrated with pure or almost pure sea-water, as it disappears as a full-grown timber tree in allotments Nos. 194 and 199, below which the water is salt and phosphorescent, and appears south and west of those islands only occasionally among the gengwa and goran of stunted growth, similar to that found in the western allotments. This will account for its non-appearance as a timber tree in the 24-Pergunnahs portion of the Sunderbuns, where the fresh water rivers traversing the tract are smaller than those in the Jessore district.

12. "I have made a further attempt to ascertain the age of standing sundri by inquiring from wood-cutters and others, and from information received from them, coupled with my own observation of the forests where fellings have formerly been carried on and large numbers of mature trees are now standing, I consider that from 25 to 30 years is the limit required for the production of a full-grown tree. Judging from the large number of mature sundri, standing and fallen, found dead all over the allotments, I do not think

it is a long-lived tree; for though no doubt many die from their top branches being blown off in the heavy storms that pass over these islands, moisture being thus admitted into the heart-wood and causing it to rot, a very large number of the dead trees examined by me were perfectly sound throughout. From this it would appear, no sign of borers or other wood-eating insects being present, that they had died a natural death, which may be taken as a proof that the forests are not worked to the full extent their growth would bear.

13. "The condition of the forests is decidedly healthy, they are completely stocked, the growth of the timber is most vigorous and generally straight (except in low swampy ground), free from large creepers, and the natural reproduction of sundri, seedlings of which tree form the chief undergrowth inside the islands, may be said to proceed as fast as it is possible for any tree under the most favorable circumstances to reproduce itself. The trees grow up very close together to a height of 40 to 50 feet, giving a bole of 18 to 30 feet without branching, the bole occasionally reaching 35 feet (I measured two trees, cut in block No. 230, loaded on a boat proceeding to Narail, Jessore district, 42 and 36 feet in length, with mean girth 46 and 37 inches respectively, the bole of the former tree 35 and of the latter 31 feet), and when mature, vary in girth form 4 5 to 6·5 feet, a girth of 6 feet and over being rare. The finest timber is found in the allotments east of the Pussur river, and in those north of lots Nos. 206, 205 and 235, on the west of that river; but the growth is not so fine in the forest to the extreme south of the Chota Sellagang, where, though straight and numerous, the trees are stunted compared with those found in the remaining portion of the tract, and do not attain a height of more than 30 feet with a bole of 18 to 20 feet, the foliage having generally a diseased appearance, and most of the mature trees bearing parasites, which is probably caused by the soil being saturated with almost pure sea-water, and therefore not suited to the production of sundri timber of the finest quality. The roots of the sundri do not penetrate deep into the ground, but spread laterally from 2 to 3 feet below the surface, sending out blind perpendicular tough shoots, which stand from 3 to 15 inches in height all round the parent stem; and where there are many trees very close together, walking through a sundri forest is something similar to finding one's way among a fine growth of inverted tent pegs.

14. "There are no timber depôts, properly so called, within the forests. The trees are felled in various parts of the tract, and dragged out either with rough ropes made by twisting the bark of the 'bola' (*Hibiscus tiliaceus*) or with the stem of the 'kolia lota,' a creeper, along rough tracks formed by placing branches of trees, about 4 feet apart, on the ground, to the banks of the smaller khals, of which there are large numbers in each allotment, when they are lashed on to either side of small boats and taken out to the main or large river, where the timber boats are anchored. The branches and upper parts of the trees are cut into 4 to 6 feet lengths for fire-wood and carried to the banks of the khals, where they are loaded on small boats and transported to the main anchorage. The anchorage is selected by the 'fakir' who has taken the particular allotment from which the timber is felled under his protection, and is generally situated opposite the spot on which the small tent-like huts, containing images of various forest deities, have been erected. Sundri is a heavy timber and will not float; the logs are therefore either loaded on the boats or lashed on to their sides with ropes and allowed to drag along under water. Occasionally two or three of the longest trees are laid across the top of the boat and others are tied to the projecting portions on either side with ropes of such length as to allow of the pendent logs being just covered by the water. The timber is thus exported to the various markets.

15. "The chief markets are the following towns in the Backergunge district:—Baolabahirgunge (sometimes called Kaligunge), south of Barisal; Jhalocati, and Nalchitti, to which places by far the largest portion of sundri timber finds its way in the first instance, and where boat-building is carried on to a large extent. Sâl from Nepal is also said to be purchaseable in the above markets. The timber is here converted (sometimes sawn, but more often split with edges and smoothed down with an adze) into planks and prepared for

mast-pieces, &c., and exported in large quantities to Calcutta *viâ* Culna and the numerous other markets in the 24-Pergunnahs, Jessore, and Backergunge. Very few sundri logs are carried direct to Calcutta. The next largest market to those above noted being Culna and Narail, in the Jessore district, where large numbers of boats are built. The timber on arrival at these principal markets is bought up by mahajuns, who have the boats built; and loading them either with grain, planks, or mast-pieces, &c., despatch them to Calcutta, where the boats are sold to fuel or grain-merchants. The following are noted as the minor markets:—

Division.	Districts.	Markets.
Presidency	24-Pergunnahs	Harwah, Tanki, Buseerhat, Baduria, Goberdanga, Khanjia, Debhatta, Borodul.
Ditto	Jessore	Dumria, Jinu Bazar, Mostubghatta, Japtha, Surappur, Surkhali, Beshkhali, Kaligunge.
Ditto	Backergunge	Perozpore, Kewari, Gurkul, Burisal, Scalghun, &c.

"The port of Morellgunge and the village of Pertabnuggur are the nearest market-towns to the sundri forests.

16. "The lines of export are very numerous, as the map shows. The following are those most frequented:—To Calcutta up the Sipsah river *viâ* the Menus and Ghutiakhali rivers and Corali khal to Kaligunge (24-Pergunnahs), or up the Calputtua to the same place, and thence *viâ* Jabuna river and Hinsi and the Kutta khals through the Ballighatta canal. All boats from the sundri forests for Calcutta direct are obliged to pass Kaligunge (24-Pergunnahs) except during very fine weather; and even then very few boatmen will risk the lower passage from the Mandah river down the Attara Banka and up the Roymungul river, as the latter place is so exposed. To Culna, up the Pussur river; to the chief markets in the Backergunge district *viâ* the Balisur river, Damuda nuddy, Kowkhali Jungulea, and Dhunsidhi rivers into the Bishkhali river. All the smaller rivers are frequented more or less by timber and fuel boats passing up to the numerous minor markets.

17. "There are no villages within the tract. I visited ruins of what appears to have been a fort, or enclosed court-yard, or square, built of burnt country brick, enclosing a tank about 120 feet square, in which the water is only slightly brackish. This is situated about 500 yards from the Morzal river above the Callir khal in allotment No. 233. The most perfect wall was not more than five feet in height, and its extreme length 380 feet. The cornice bricks and those inside the arches were cut or chiseled out with rough figures and ornamentations. There are said to be ruins of various buildings in the interior of this island, which is now as densely covered with forest as any of the adjoining lots—among others a musjid, or temple, said to have an arched roof and to be in a tolerably good state of preservation; but the tiger-pugs were too numerous and fresh, and especially round the tank, to render a further exploration inviting.

18. "I am not aware of any rights possessed by the inhabitants of the surrounding districts, but at present any one who is so disposed trades in timber and fire-wood from all parts of the forests. The 'fakirs,' who look after the spiritual wants of the wood-cutters, and by the use of numerous charms and incantations do their best to protect their bodies from the tigers, in consideration of which services they receive a share in the value of the timber exported, have great influence with all classes of men who carry on the trade, and may be said to be working the forests on their own account, as they point out the allotments in which timber is to be felled; and without the 'fakir's' countenance and protection no wood-cutter will enter any allotment. I have met numerous boats wandering about the rivers looking out for forests in which a 'fakir' has taken up his post. During my tour sundri timber was being felled in the following allotments:—

"Numbers 206, 208, 230, 232, 248, and at five points in the unallotted portion east of the Pussur river.

"The party working in No. 232 made an abrupt departure while I was anchored just opposite their head-quarters, in the Manki khal, having lost six men carried off by tigers within ten days; and I met the 'fakir' who had charge of the working party in No. 248 as I was going down the Pussur river, who was making off to some other allotment, he having lost three men during the previous week from the same cause. The working parties are continually shifting their positions from one cause or another, which accounts for no portion of the tract showing any appearance of being over worked."

19. It appears from the above that the sundri (*Heritiera littoralis*,) the most valuable of the timber trees, will not grow on soil which is exposed to water more than slightly brackish, but that it is found over the greater portion of the 1,083 square miles; that its growth is very vigorous and its reproduction everything that can be desired. The age at which the tree reaches maturity is estimated at 25 to 30 years. Judging from the surveys made by Mr. Home (see Appendix II), the average contents of sundri per acre would be as follows:—

Seedlings and saplings (under 3' girth) = 2,487 per acre.
Trees (above 3' girth) = 182 per acre.

Allowing even that the surveys made give results above the average, the forests must be called extremely rich—in fact inexhaustible for all practical purposes, considering the large extent of the area.

20. The question of deriving a revenue from the Sunderbuns is now before Government, and it is expected that a final decision on the subject will soon be arrived at.

CHITTAGONG DIVISION.

FORESTS ON THE NAAF RIVER.

21. The Commissioner and Conservator of Forests of Chittagong writes as follows:—

"The Assistant Conservator of Forests has during the year visited only one fresh tract, viz. that on the Naaf, in the extreme south. He has described the results of his inspections as follows:—

22. "From a little south of Ramu the country becomes woody, but does not continue so the whole way; on the contrary there are large gaps of open ground, parts of which are now being brought under cultivation, whilst others are covered with grass and scrub jungle. About five miles from the head of the Naaf the country again presents a timber-covered appearance; but when fairly in amongst the standing timber, you perceive the wreck of what must formerly have been a magnificent forest. The cyclone of 1872 has caused the fall of most of the trees, and I do not think that more than one is standing out of every ten that stood before the gale. From the description that was given to me of the appearance of this forest prior to its destruction, it evidently was one of the best stocked in the district; no top light penetrated, and it was passable along the Arrakan road for fully an hour in perfect shade.

23. "On the west bank of the Naaf there are isolated patches covered with trees, but nothing sufficiently valuable to attract any large number of wood-cutters. A few men now resort to them solely on account of their being able to cut without any charge.

24. "On the east side the forests are within the Arrakan district principally; but towards the source of the 'Pruma,' two streams, named the Big and Small Darges, flow into it out of the Chittagong Hill Tracts, and all forest produce cut in this locality passes down the 'Pruma' through the Arrakan district and enters Naaf. Owing to the establishment of forest toll-stations on the rivers of the Chittagong district, boat-building has increased in this direction, and it is estimated that full 2,000 boats are now constructed annually here. Ship-building has likewise been taken in hand, and whilst on my tour I saw a new vessel just launched of about 200 tons, built of jarul, with kurri knees and crooks, and kandel masts and spars.

25. "It has been suggested by the Assistant Conservator that as timber and other materials from the Chittagong Hill Tracts forests pass through Arrakan, arrangements might be made with the authorities in British Burmah for the levy of tolls on all produce that is brought down, and that the revenue might afterwards be allotted to either side in accordance with the proportion coming from the respective districts.

26. "The proposal appears to me to be advisable, both for the purpose of imposing some restriction on wasteful and indiscriminate felling of timber in the forests alluded to, as well as for the purpose of deriving a legitimate revenue; but I am of opinion that the proposal may stand over for the present, pending decision regarding the proposed transfer of the Cox's Bazar sub-division to Arrakan.

27. "The Assistant Conservator reports further that though anxious to do so, he has not visited the forests in the Lushai and Fenny country during the year through fear lest complications should arise with the wild tribes. With reference to these observations, and as regards this country, the Deputy Commissioner has offered the following remarks:—

"To my knowledge the aspect of the forest in the Lushai country does not differ materially from that on this side of the border till a distance is reached so far to the east that no trade in timber could possibly be carried on from there. Besides, even supposing the most valuable timber existed in that country within a reasonable distance from the border, there are no navigable rivers down which timber could be floated; and any one who has been in these hills knows that timber cannot be conveyed by land for more than a few hundred yards without costing more than it is worth. Mr. Davis is in error in supposing that there are any wild tribes on the Fenny. It is true there are some troublesome and quarrelsome Tipperahs there, but he need apprehend no violence from or complications with them, if notice of his visit is sent from this Office."

28. With regard to the subject discussed in paragraphs 25 and 26, the Conservator of Forests, Bengal, has to draw attention to the fact that, as far as he is aware, all timber except iron-wood, (*xylia dolabriformis*) is free in Arrakan, and consequently there would be some difficulty in taxing the portion coming into Arrakan from Chittagong, unless toll-stations are established on the boundary between the two, which will in all probability prove impracticable.

ASSAM DIVISION.

29. The Eastern Dooars and a portion of the Garo Hills, hitherto belonging to the Cooch Behar Division but now transferred to Assam, were inspected by the Conservator during November and December, and certain portions of them were afterwards examined in detail by Mr. W. Shakespear, who fell sick towards the end of the season and proceeded on leave to Europe. He submitted sketch maps of the Ripu, Chirung, and Sidli forests, with a set of valuation surveys and a general description of the forests. Unfortunately the map and survey statement of the Ripu forest was lost by the Post Office, and copies will have to be obtained from England in case the missing packet should not be recovered. The following remarks are based on the Conservator's own observations, augmented by Mr. Shakespear's data.

EASTERN DOOARS, GOALPARA DISTRICT.

30. The Eastern Dooars comprise a tract of country about 70 miles long from east to west and 27 miles broad from north to south, covering an area of 1,862 square miles. They are situated immediately at the foot of the Bhutan hills and north of Goalpara, the whole being a vast plain with slightly raised plateaus here and there rising to a hundred feet at the utmost. Numerous water-courses intersect the tract from north to south, most of which are dry during a great part of the year, the water disappearing close under the hills and reappearing in the southern part of the Dooars. The northern part is almost entirely uninhabited, whereas the southern part is fairly populated. The total

number of inhabitants amounts to 37,047, or 20 per square mile. Like the Western Dooars, the Eastern may be described as a grassy plain with forest tracts scattered over it. Of these the following were declared Government open forests under the rules of 1871:—

The Goma forest	.. ..	15,779 acres.
„ Ripu „	.. ..	41,635 „
„ Chirung „	.. ..	1,57,293 „
„ Sidli „	.. ..	47,600 „
„ Khairbunna forest	.. ..	8,039 „
	Total ..	270,346 „ or 422 square miles.

31. The forests may be classed as follows:—

Sâl forest.
Dry mixed plain-forest.
Khair and sissu forest.
Savannah forest.
Evergreen mixed plain forest.

The composition of sâl and dry mixed plain forest is the same, the prevailing trees being:—

Sâl	*Shorea robusta.*
Akshi	*Dillenia pentagyna.*
Baura	*Terminalia Belerica.*
Kum	*Carega arborea.*
Sida	*Lagerstroemia parviflora.*
Gia	*Garuga pinnata.*
Bahala	*Semecarpus anacardium.*
Phulgogra	*Schima Wallichii.*
Simbola	*Bombax malabaricum.*
Udola	*Sterculia villosa.*
Ambolai	*Emblica officinalis.*
Kurma	*Bauhinia sp.*

In the sâl forest, sâl predominates, whereas it is found only here and there in the dry mixed plain forest.

The khair and sissu forest contains as usual—

Khair	*Acacia catechu.*
Sissu	*Dalbergia sissu.*
And a good deal of safet sirris ..	*Albizzia elata.*

The savannah tracts consist of grass with a sprinkling of trees, or no trees at all. The evergreen mixed plain forest is of the same description as that found all over Assam, containing in particular:—

Cham	*Artocarpus Chaplasha.*
Gunseroi	*Camphora glandulifera.*
Tun	*Cedrela Toona.*
Lauria (*Sonalu*)....	Mesua ferrea, the Assam iron-wood.
Jam	*Eugenia Jambolana.*

The native names given above are all Mechi names.

32. The distribution is as follows—sâl, dry mixed plain, and savannah forests alternate in the western half; evergreen, savannah, and dry mixed plain forest in the eastern half of the Dooars; and khair and sissu forest is found along water-courses as usual.

33. *The Goma forest* has not been specially examined; it is reported to contain a good deal of young sâl, but no mature trees.

34. *The Ripu forest* contains dense tall grass, over which the trees are scattered in some parts in single trees, in others in groups of greater or less extent. Sâl appears chiefly in the southern portion, where it covers the ground well in some parts, the area of which is, however, a small fraction of the whole. In the centre and northern part sâl trees are found only here and there, but seedlings are plentiful in most parts of the forest. The trees now remaining are all of small girth. During a march of some 6 miles through the forest from south to north only 1 tree of 5′ girth, 6 of 4′, and very few even of

3′ girth, were observed. The growth, however, is in almost all parts very fair, although the trees have evidently suffered severely from jungle fires. Along both banks of the Pekua nuddy, for several miles from the foot of the hills downwards, a strip of khair and sissu is found. Of the former no large trees were observed, whereas a good many old sissu were noted. The line of export from the Ripu forest is down the Gurpala and Jakati, two small streams on the west of the forest, said to be fit for floating in the rainy season, and by which the timber can be brought to the Brahmaputra. The Pekua nuddy is unfit for floating for some distance south of the forest. When Mr. Shakespear's map and valuation statement have been recovered, it will be possible to form an idea of the area covered with sâl, and of its contents.

35. *The Chirung forest* may be separated into two blocks by the Saumoka river. That to the west of it comprises 88,088 acres, and the one to the east 69,205. The Saumoka may be called the western boundary of the Assam evergeen mixed plain forest, which here begins to take the place of sâl forest. This latter species is not met with except in single trees in the Chirung forest east of the Saumoka. On the other hand, the Chirung forest west of the Saumoka contains remarkably fine tracts of sâl, especially west of the Hel nuddy. There are comparatively few trees of 4′ 6″ in girth and upwards at present; but seedlings, saplings, and young trees, are so numerous, that this tract, if protected against cutting and cultivation, will become in 25 to 30 years one of the richest sâl forests in Bengal, capable of yielding hereafter 10,000 trees and upwards per year. From Mr. Shakespear's maps and valuation surveys it appears that the sâl forest occupies chiefly three blocks:—

One west of the Hel nuddy ..	..	24	square miles.
„ west „ Saralbanga ..	..	3	„ „
And one east of the Saralbanga	..	9	„ „
	Total ..	36	„ „

With the following sâl trees in them:—

Seedlings (under 1′ 6″ girth)	..	533,323
Saplings (1′ 6″ to 3′ „)	..	384,289
Young trees (3′ to 4′ 6″ „)	..	98,690
Trees (4′ 6″ to 6′ „)	..	18,490
Old trees (above 6′ „)	..	1,112
Total	..	1,035,904

or 45 trees per acre.

Khair and sissu forest is found on the banks of the Hel and Saralbanga rivers.

36. *The Sidli forest* may be called a continuation of the Chirung forest towards the south. It consists of alternate patches of sâl, savannah, and mixed plain forest, the latter being chiefly found in the northern part. The sâl forest, it may be estimated, covers about half the area, or 36 square miles, containing the following sâl trees:—

Seedings	982,471
Saplings	376,083
Young trees	49,608
Trees	5,820
Old trees	None.
Total ..	1,413,982

or 61 per acre. Although this is a higher figure than that given for the Chirung forest, the latter is more valuable, because it is richer in middle-aged trees, and their growth is superior.

37. The streams by which timber can be removed from the Chirung and Sidli forests are the Hel nuddy, from its junction with the Bursunjora the Bursunjora, which however, is very narrow and winding; the Longa nuddy;

the Saumoka, from its junction with the Kashikori, and the Champan nuddy, a stream navigable by boats at all seasons of the year, up to its junction with the Borobur nuddy.

38. Recapitulating now, it may be said that the Ripu, Chirung, and Sidli forests, which form one great block, contain at a rough estimate about 80 square miles of sâl forest, with some 2½ millions of sâl trees, saplings and seedings. If these forests are reserved and protected against cutting and cultivation, they will yield in course of time not less than 25,000 sâl trees per annum. All these forests have been heavily worked before the Dooars were taken from Bhutan. They are intercepted by numerous timber-paths running from north to south, which are now used for the transport of sâl-timber from the lower Bhutan hills to the floating streams. From statistics collected during the year, it appears that some 27,000 pieces of sâl, each 6 feet long, have been rolled from the hills down to the floating streams, and thence transported to the Brahmaputra.

39. It appears that many new cultivators have settled of late years in the southern portions of these forests, especially in the sâl tracts, and steps should be taken at once by the Assam Forest Department to prevent the destruction of the forests.

40. *Of the Khairbunna forest*, we know very little or nothing at present; but it appears from report that a large portion of it is stocked with khair, and probably with sissu.

GARO HILLS.

41. The Garo Hills district comprises the western portion of the spur which runs from the Indo-Burmese range towards Bengal. It is a hilly country throughout, the highest range reaching a height of about 4,500 feet, and running out into the plain towards the south, west, and north. The area of the district comprises 3,390 square miles, with an estimated population of 80,000 inhabitants, or 24 to the square mile. Almost the whole of the district is forest land, in which the Garos carry on joom cultivation.

42. Up to the present only the northern slopes have been examined; the Manda range by the Conservator of Forests, and the Kishnai and Jinari-Azagur ranges by Mr. Shakespear. The Manda range comprises an area of about 36 square miles, the Kishnai range 65 square miles, and the Jinari-Azagur range 122 square miles; so that the northern slopes which have been examined may be put down as covering 223 square miles. This tract consists of hills falling from about 2,000 feet in the southern parts to the level of the Goalpara plain.

43. The area is drained in the east by the Manda nuddy and its numerous feeders, of which the Chichira and the Bangshi are the largest. The two former contain a slight current of water in the cold season, and they are navigable by boats in the rainy season up to a short distance above their junction, which is effected about half way between Chima and Mejolgiri. The Bangshi is also navigable by small boats in the rainy season for some distance above its junction with the Manda. The Kishnai nuddy is navigable in the rains up to the village of Rongrongri, some five miles below Thapa. Its principal feeders are the Ronghri, Rongrong, Dumi, and Thapa joras, of which the last mentioned is navigable in the rains for a short distance beyond its junction with the Kishnai. The western part is drained by the Jinari, Azagur, and their feeders, of which the Drick and Doljong respectively are the largest. They are navigable in the rains, the Jinari to Rongokgiri; the Azagur about five miles within the Garo boundary; the Drick to Khamagiri, a few miles west of Gokulgiri; and the Doljong to Mechpara. The country is accessible by foot-paths kept up from village to village.

44. The under-lying rock seems to be everywhere of a granitic formation, especially gneiss. The soil is almost everywhere a light sandy loam of apparently good quality in the eastern valleys, but somewhat inferior towards the west. The climate is very damp.

45 The forest may be classed as *lower hill* forest containing sâl, with patches of deciduous mixed plain forest where the joras emerge from the hills. It has a partly deciduous aspect on the drier portions, and an evergreen aspect

near the water-courses. A list of the species of trees observed by the Conservator of forests in the Manda valley will be found in Appendix III. Mr. Shakespear has noted a number of additional species in the Kishnai and Jinari-Azagur ranges, but it has been found impossible to identify them. On the whole there is no doubt that the total number of species is considerably larger than that given in Appendix III, which should be considered as a commencement towards classifying the several kinds.

46. The most important tree is sâl, which grows in all parts of the tract, but particularly so in the eastern portion and less towards the west. It must have formed the chief constituent in former years, but cuttings and jooming have sadly reduced it. Jooming is carried on almost everywhere in regular rotation. The Garo villages occupy each a circle of up to five miles radius, within which by far the greater portion is periodically cultivated. The mature sâl trees formerly found in the more accessible parts have all been removed, and it is only some miles from the floating streams that trees upwards of 3 cubits in girth are still found; but even there they are not numerous, owing to jooming having been carried on for many generations. Seedlings and saplings, for the same reason, are only limited in number. The localities where trees of upwards of 3 cubits are chiefly found now are, in the Manda range—

(1) Around Gabula, and towards the south of it;
(2) Immediately north of Bangshi; and
(3) On some of the low hills near Chima.

Single trees are found everywhere. The total number of trees of the above-mentioned girth in this range is estimated at less than 4,000. In the Kishnai range Mr. Shakespear estimates that not more than 300 trees upwards of 3 cubits girth could be found, and in the Jinari-Azagur range not more than about 700; so that not more than 5,000 sâl trees of upwards of 4′6″ girth can be counted upon in the whole area of 223 square miles. The growth of the sâl trees, as well as that of the trees generally, is very vigorous, and bamboos form a large admixture, especially in the eastern part of the tract. Joom cultivation is a bar to a favorable regeneration of sâl, unless it could be kept out of certain areas, a question which may now be considered by the Assam authorities. The Conservator fears, however, that any restriction to jooming in the case of an uncivilised people like the Garos will be difficult to effect.

47. Of other species, *bolashari* (*Lagerstroemia Reginæ*) deserves special mention. It is rare in the Manda range, but appears in large numbers in the Jinari-Azagur range. *Boldak* (*Schima Wallichii*) grows most luxuriantly; *Chambu* (*Engenia Jambolena*) is exported; and figs, oaks, and chestnuts are found everywhere, the latter two always near water-courses. Of India-rubber (*ficus elastica*) only one seedling has been observed.

48. At present only sâl, and to a limited extent *bolashari*, are cut for export. The forests are worked by so-called dafedars, who obtain permission from the Deputy Commissioner of the district to cut timber, to bring it to a place near the Brahmaputra, where the pieces are counted by a subordinate of the Deputy Commissioner, and to pay for each piece (6 feet long) at a certain rate. This rate used to be 4 annas, but a revision is now under consideration or has been effected. The dafedars send gangs of wood-cutters into the forest who cut the timber into pieces from 6 to 7 feet long, roll and push them to a spot on one of the floating joras which can be reached by boats, and during the rains the timber is floated or boated away to the Brahmaputra and to Goalpara, where it is sold. Pieces of a girth upwards of 4 feet fetch from Rs. 8 to Rs. 16 per pair, according to size and quality. A great portion of this timber is taken down the Brahmaputra towards Serajgunge and Dacca. In addition young trees are cut up into house-posts, measuring up to 3 feet in girth, and some 18 feet long; they fetch from Rs. 3 to Rs. 4 per pair. *Bolashari* is paid for at the rate of Rs. 3 to Rs. 6 per pair of pieces 9 feet long. The mode of working is very wasteful, and the Conservator estimated that

not more than 50 per cent. of the marketable timber actually reach the Brahmaputra, the rest remaining in the forest to rot or to be consumed by jungle fires.

49. The forests are all considered as belonging to Government. The Garos claim the right to joom, and in addition the laskas, or headman of the the villages, claim the forest produce as their own—an assumed right which, it appears, is not recognized by Government.

50. In addition to the above, inspection was carried out in several other districts of Assam, about which Mr. Mann reports as follows :—

JIRUNG FOREST, KHASI HILLS.

51. The Jirung forest was inspected with the view of reserving it. The Deputy Commissioner, by order of the Commissioner of Assam, summoned the Chief of Jirung and explained to him the object of conserving his forests and the measures necessary to effect this; but the Jirung people refused to have conservancy measures introduced, because if this was done they would not have the uncontrolled run of the forests to fell timber as they liked, and they were not willing to give up their right of jooming any part of it they might wish to bring under cultivation, without which they said they could not exist.

52. "No proposals regarding the other sâl forests inspected on the northern slopes of the Khasi Hills could be submitted for approval, since the boundary between the Kamroop district and the Khasi Hills is not settled as yet.

KAMROOP.

53. In the Kamroop district, away from the Khasi Hill boundary, three small blocks of sâl forest were inspected, measuring in the aggregate five square miles, and reports submitted to the Deputy Commissioner of the district, before applying for the Chief Commissioner's sanction for reserving them.

NOWGONG.

54. The forests along the foot of the Jynteah Hills, in the Nowgong district, were inspected for the same purpose, and two small blocks, measuring in the aggregate 0·9 square miles, and a bamboo forest measuring about 2·328 square miles, were selected, and the proposals submitted to the Deputy Commissioner of the district.

NAGA HILLS.

55. The extensive mixed evergreen forest between the eastern foot of the Rengmah Hills and the Rengmah Pani, situated immediately south of the present Nambor reserve, were inspected; an area of 327 square miles selected, and proposals submitted to the Deputy Commissioner of the Naga Hills for an expression of his opinion as to the advisability of reserving it. This forest is the chief source of timber supply for the Seebsaugor and Nowgong districts, since there are but very small areas of sâl forest in the latter district, and moreover without mature trees in them at present.

SEEBSAUGOR.

56. In the Seebsaugor district the mixed plain forest, situated between the Dehing and Brahmaputra rivers in the north, and the Dimu and Desang rivers in the south, was inspected with a view to having it reserved for the supply of timber for the eastern portion of the Seebsaugor district, and proposals were submitted to the Deputy Commissioner. This forest was selected, not because it is at all superior to the rest of the forests on the Dehing river, but because there are fewer villages in the neighbourhood, and less danger therefore of trespass and less interference with the inhabitants."

SECTION II.—RESERVES.

57. Steady progress has been made during the year in the formation and detailed examination of reserves in the Cooch Behar Division as well as in Assam. This work, if done in a satisfactory manner, takes a great deal of time, and several years more will be required to complete the work in the above mentioned two divisions.

58. The following table shows the area of the reserves at the beginning and end of the year 1873-74 :—

	Area at the beginning of the year 1873-74.	Added during the year.	Total at the end of 1873-74.
	In square miles.		
Cooch Behar Division	106	14	120
Assam Division	214	103	317
Total ...	320	117	437

In addition, 158 square miles in the Cooch Behar Division have been examined, valued, and mapped, of which about 100 will probably be declared reserves, and in Assam some 350 square miles are under discussion.

COOCH BEHAR DIVISION.

DARJEELING.

59. During last year a beginning was made towards a detailed examination of the reserves, by surveying, valuing, and mapping the Mahanuddy terai range, comprising an area of 8,404 acres. The results are recorded in paragraph 106, and Appendix D of the Annual Report for 1872-73. The Conservator has now to add the following remarks :—

The forest being chiefly sâl forest and khair and sissu forest, the working must be arranged with special reference to sâl and sissu. Of *sâl* we have in the range—

Young trees	27,814
Trees	5,360
Old trees	734
Total ...	33,908

Considering that it takes about 60 years for a tree of 3 feet girth to obtain a girth of 6 feet, and that the forest is somewhat poor in mature timber, and assuming that one-third of the trees are not fit to yield marketable timber, the range can be worked for the present up to 250 trees per year in a round figure. The best plan would be to suspend cuttings for about 10 years, but this is impossible on account of the large demand for timber. However with a yield of 250 trees per year the forest will gradually improve, and the yield will rise very considerably in course of time.

Of sissu we have—

Young trees	1,825
Trees	297
Old trees	17
Total ...	2,139

So that the present annual cuttings should not exceed 25 trees, if necessary, otherwise cuttings should be suspended altogether for 10 years. The felling of the other species of trees may be arranged according to circumstances and requirements.

60. During the present year the work was proceeded with in the *Sivok hill tract*, adjoining the Mahanuddy terai tract to the north. The examination was done by Messrs. Gamble and Fuchs, but owing to the illness of both these officers it has not been quite completed. The system of valuation survey was to take lines along the streams and the ridges between them, and, wherever practicable, across from stream to stream, but the exceedingly steep and precipitous nature of the hills almost entirely prevented any lines but those

of the streams and ridges being chosen. The detailed description of the range will be found in Appendix IV, from which the Conservator's few remarks are taken. The area of the range stands as follows:—

Lower hill forest ...	...	7,328 acres	= 11·45	square miles.
Hill Savannah with cultivation	...	2,912 „	= 4·55	„ „
Total	...	10,240 „	= 16	„ „

The boundaries are, on the *north* and *west*, the Silimbong ridge; on the east the Teesta; and on the south the Sivok river. The whole tract consists of hills with tolerably gentle slopes in the western part, covered by hill savannah with jooms made by Lepchas, and with steep slopes in the centre and eastern part, covered with lower hill forest. The line of export is down the Sivok and Teesta rivers towards Julpigoree and the Brahmaputra. The most valuable kinds of trees are—

Sâl	...	*Shorea robusta.*
Saj	...	*Terminalia tomentosa and glabra.*
Cheloni	...	*Schima Wallichii.*
Katus	...	*Castania and castanopsis sp.*
Tun	..	*Cedrela Toona.*
Champ	...	*Michelia sp.*
India-rubber	...	*Ficus elastica.*

The growth of the trees is most luxuriant. The quantity of growing material is calculated as follows:—

	Sâl	Saj	Cheloni	Katus.	Tun	Champ.	India-rubber
Young trees 2-3 cubits ...	7,541	2,209	4,129	1,964	1,049	44	468 seedlings
Trees 3-4 cubits	4,218	1,874	2,968	982	803	44	
Old trees above 4 cubits	4,307	4,218	3,281	580	1,406	44	1,116 trees fit to tap
Total	16,069	8,301	10,378	3,526	3,258	132	1,584

or 41,664 timber trees of the better kinds, besides a large amount of less important trees. The amount to be cut annually must be regulated by the rate of growth of sâl, and the maximum yield per annum would stand for the present as follows in round figures:—

Sâl trees	...	...	...	...	180
Saj trees	...	...	...	...	100
Cheloni trees	...	...	...	...	120
Katus trees	...	...	...	...	50
Tun trees	...	...	...	...	50
			Total	...	500

The numbers for katus and tun are somewhat higher in proportion than the others, as the growth of these trees, especially that of tun, is faster than that of sâl.

61. With regard to the number of India-rubber trees, Mr. Gamble thinks that the estimate is probably somewhat above the truth, as this tree grows very locally, and as many of the survey lines passed through these localities. India-rubber grows in this tract perhaps more luxuriantly than in any other part of the Darjeeling district; and if plantations of the tree are to be established, the Sivok lower hill range should be chosen for the purpose.

WESTERN DOOARS, JULPIGOREE DISTRICT.

62. The Maraghat forests were examined in 1872-73, and by a notification dated the 14th March 1874 the following two blocks, comprising an area of 13·77 square miles, were declared Government reserved forests.

I.—*Muraghat Sâl Forest.*

1. *Area.*—

Sâl tracts	...	...	2,992 acres.
Savannah tracts	...	...	4,688 „
Total	...		7,688 acres = 12 square miles.

2. *Boundaries.*—*North*, a line from the source of the Kanai nuddy to the source of the Garati nuddy; *east*, the Garati nuddy, then a short line to the source of the Ghairkuta nuddy, then the Ghairkuta nuddy; *south*, a line from the Ghairkuta across the Garati to the Kanai nuddy; *west*, the Kanai nuddy.

3. *Topographical description.*—Level ground drained by the Kanai, Garati, and Ghairkuta nuddies, which on joining form the Dudua, a nuddy fit for floating.

4. *Soil.*—A light sandy loam, occasionally with gravel.

5. *Description of forest.*—The reserve may be described as a grassy plain with patches and blocks of sâl forest scattered over it. The three chief blocks of uninterrupted forest comprise 1,927, 645, and 420 acres respectively. Sâl is by far the most numerous tree, and it is associated chiefly with—

Akshi	...	...	*Dillenia pentagyna.*
Kum	...	...	*Careya arborea.*

Besides these there is a limited number of the following species to be found:—

Cheloni	...	...	*Schima Wallichii.*
Sida	...	...	*Lagerstroemia parviflora.*
Baura	...	...	*Terminalia Belerica.*
Saj	...	...	*Terminalia tomentosa* (*a few only*).
Gia	...	...	*Garuga pinnata.*
A few Katus	...	...	*Castanopsis sp.*
Horse Chestnut	...	...	*Aesculus sp.*

and others, especially a few *ficus laccifera* and *obtusifolia*. The growth of sâl is good all round, and excellent in many parts of the reserve. Where the fires are heavy, no creepers have been observed; but where sâl grows close together, it is much exposed to injury from creepers.

6. *Timber Depôts.*—There is a depôt on the Dudua, where the Julpigoree-Alipore road crosses it.

7. *Timber markets.*—The towns and villages in the Cooch Behar state.

8. *Lines of export.*—Down the Dudua to the Jaldaka and Brahmaputra.

9. *Villages within the reserve.*—None.

10. *Rights of surrounding population.*—None.

11. A *map* of the reserve on a scale of two inches to the mile has been prepared.

12. *Working plan.*—The growing stock of sâl has been calculated from minute valuation surveys made by Messrs. Fisher and Johnston, giving the following results:—

Seedlings (under 1′ 6″ girth)	...	...	95,744
Saplings (1′ 6″ to 3′ girth)	...	...	47,872
Young trees (3′ to 4′ 6″ girth)	...	...	18,550
Trees (4′ 6″ to 6′ girth)	...	...	1,496
Old trees (above 6′ girth)	..	...	15
Total sâl trees		...	163,677

As the forest, in consequence of former heavy cuttings, is now comparatively poor in middle-aged and old trees, it is proposed not to work it for the next ten years at any rate, but merely to protect it against fire, cutting, grazing, and cultivation. Dead and fallen trees will be worked out as a matter of course. Hereafter the forest will be capable of yielding several thousand trees per annum if not overworked before it had time to produce the normal stock of growing material.

II.—*The Dainah Sissu Forest.*

1. *Area.*—Sissu forest = 1,132 acres = 1·77 square miles.

2. *Boundaries.*—*North*, the Dainah river; *east*, an old bank of the Dainah river, then the Kulpani and Khairkata nuddees; *south*, the Khairkata nuddee; *west*, the Dainah river.

3. *Topographical description.*—The reserve consists of a strip of land about 3 miles long and from 1,000 feet to a mile broad, immediately on the bank of the Dainah river. The whole tract has been the bed of this river at one time, and consequently it lies below the level of the surrounding country.

4. *Soil.*—Sand and gravel.

5. *Description of forest.*—The reserve contains almost nothing but sissu (*Dalbergia sissu*) of very fair growth. It is insufficiently stocked at present, there being only about eight trees and seedlings per acre. If protected against fire, cultivation, cutting, and cattle, the forest will soon stock itself completely, as there are indications of the natural reproduction being easy. Hitherto cattle have eaten the young seedlings year after year.

6. *Timber depôts.*—None at present.

7. *Timber markets.*—The town and villages of the Cooch Behar state.

8. *Lines of export.*—Down the Dainah and Jaldaka to the Brahmaputra.

9. *Villages within the reserves.*—None.

10. *Rights of the surrounding population.*—None.

11. A *map* of the reserve on a scale of two inches to the mile has been prepared.

12. *Working plan.*—From the surveys made by Messrs. Fisher and Johnston, the forest contains at present the following stock of sissoo :—

Seedlings	...	...	...	...	906
Saplings	...	...	...	...	3,317
Young trees	...	...	...	...	3,339
Trees	...	...	...	...	1,177
Old trees	...	...	...	...	271
				Total ...	9,010

For the next five years no timber, except dead and fallen trees, should be removed, but the forest should be protected against fire, cultivation, cutting, and especially against cattle. At the expiration of five years the working of the forest may be commenced by cutting annually about 50 trees, which number the Conservator has no doubt can gradually be raised to 1,000 trees per annum.

63. In addition to the above, *the Buxa plain forest* has been examined, valued, and mapped during the year by Mr. Johnston. The area of this forest amounts to 158 square miles, of which about 75 are covered with sâl forest, and 5 with khair and sissu forest, containing the following quantity of timber :—

Sâl—

Seedlings	...	...	...	...	1,402,338
Saplings	...	...	...	...	448,532
Young trees	...	..	...	...	256,207
Trees	...	...	...	...	158,549
Old trees	...	...	...	...	59,444
				Total ...	2,325,070

Of these 474,200 are trees of upwards of 3 feet girth. Considering that a tree of 3 feet girth takes about 60 years to grow into a tree of 6 feet girth, and even assuming that one-third of the trees do not yield marketable timber, the forest is capable of yielding at once per annum 5,000 sâl trees, an outturn which, with judicious treatment, will be raised in course of time to double and treble that quantity, irrespective of khair, sissu, and cheloni timber. It is

expected that the valuable parts of this forest will soon be declared Government reserved forest. A detailed description of the tracts reserved will be given in next year's report.

PALAMOW.

64. It has been decided to bring the Palamow forests, comprising an area of 178 square miles, under proper management. An establishment has been sanctioned, and the different blocks will be examined in detail during the coming cold season with the view of declaring the valuable tracts Government reserved forest.

CHITTAGONG DIVISION.

65. The question whether reserves should be formed in Chittagong or not, has not been advanced during the year, beyond some general arguments, which are recorded by the Commissioner in the following words:—

"No reserves have been formed during the year, for reasons which will be stated hereafter. On the subject of reserves, the Assistant Conservator of Forests writes as follows:—

66. "In my last annual report I went into this subject, as I thought very fully, but it would appear that though the Deputy Commissioner and Commissioner supported my views, both possessing local knowledge of the country (as far as it is possible to have any knowledge of a *terra incognita*), the Conservator of Forests opposed the project of having no reserves. Want of sufficient knowledge of the forests undoubtedly bars one from speaking with authority; but the means of locomotion in the hills for minute forest examinations are extremely limited, and without elephants or other means of land transport it is impracticable to enter into the heart of forests. The water-communication is decidedly good, and as far as it has admitted of my visiting the forests, I may say I have taken advantage of it to the utmost. Further travelling would necessitate my going over the same country again without throwing more light in our way, each and all the streams having been explored and a general idea gained. To obtain minute details the work must be done piecemeal and considerable time devoted to the work, as the area is almost unlimited. Establishments to carry out the Conservator of Forests' views (given in paragraph 129 of the annual Forest Reports for 1872-73) would have to be entertained, for which estimates could be submitted on receipt of orders specifying the area required to be treated annually.

67. "As regards the question of reserves, allowing that we procure the information required on the subject of stock in our forests, and it is found of the utmost necessity to husband what is left in the forests to the utmost, it remains to be decided whether it would not be simpler that certain localities should be entirely and declaredly closed, and no felling whatever allowed above a stated point on some of the principal rivers, in preference to adopting the revenue system at present. It must be borne in mind, as Captain Lewin remarked last year on this subject, that by closing our forests we shall drive the timber trade into Arrakan; and I would point out that it would have the effect of reducing our revenue.

68. "As regards the question of reserves, I agree generally with the opinions expressed by my predecessors when negativing the proposal of forming reserves. I must add, however, that I have at present very little personal knowledge of the forests, and that I agree with the Conservator of Forests that the question should be still left open for further inquiry.

69. "The opinions of my predecessors and of the district officers on this subject may be summed up as follows:—

"(1.) A reserve, to be of any use in the Hill Tracts, must be of immense extent, as a forest, properly so-called, of any particular kinds of trees does not exist; trees of different kinds being scattered here and there.

"(2.) The formation of such reserves would greatly harass and restrict the hill-people, and would probably result in their leaving for Hill Tipperah, Arrakan, or the Lushai counry.

"(3.) A large and expensive establishment would be necessary to secure the *bonâ fide* closing of the reserved tracts, and it is more than doubtful whether the advantage to be gained would really compensate for the annoyance caused to the hillmen and the heavy expense which would fall on the Government.

"(4.) As far as the export trade is concerned, the object of forming reserves has been to a great extent secured by the system of passes and the checks exercised at the toll-stations.

"(5.) The establishment of reserves would introduce numerous strangers and foreigners into the Hill Tracts totally antagonistic in feeling, religion, habits and customs to the Hill Tracts.

70. "As at present advised, then, it appears to me that the formation of reserves is undesirable, and to some extent unnecessary. It would also, I think, be impolitic; for the introduction of many strangers into the hills would be as objectionable as giving the officers of the Forest Department full control over large tracts of the country to the prejudice of the district officer. This latter result would be unavoidable if reserves were made, for it must be remembered that the hillmen are assentially junglemen, and that if an officer has absolute control over the jungle, it is almost tantamount to giving him absolute control over the people.

71. "It appears, however, from the Deputy Commissioner's report that to a certain extent some portions of the forest may be said to have been already reserved. His remarks are as follows:—

"As a matter of fact there are reserves in the Hill Tracts, though not reserves in the technical sense of the word. Captain Lewin proposed that no person should be allowed to cut timber beyond the undermentioned places:—above Burkul, on the Kurnafoolie; above Purwah, on the Ryn Kheong; above Khagorea, on the Kassalong; above Phindukheong, on the Sungoo; and above the Legadakheong, on the Matamoree. The upper Kurnafoolie is now practically closed to wood-cutters, it being on the high-road to the Lushai country, and the resort of strangers thither being discouraged for political reasons. Permission is occasionally given to cut timber there with restrictions on the quantity and size to be felled.

72. "A new proposal has now been made by the Assistant Conservator of Forests, and he recommends that the hillmen as well as the plainsmen should be forbidden from resorting to any forest to cut timber, whether logs, boats, or scantlings, without having in his possession a permit given by him, the Assistant Conservator, personally. He is of opinion, in short, that the present practice, by which hillmen are allowed to go to the forest and cut wherever they chose, entirely uncontrolled, should be put a stop to, though it may cause some inconvenience to them, as no proper check on the quantity to be felled yearly can be kept so long as the existing custom is allowed to prevail.

73. "I am not prepared to recommend any extension of the present rule, under which only those persons who go from the plains to the hills for the purpose of cutting timber for their own use, or for sale, are required to take a pass. The Deputy Commissioner also is strongly opposed to the proposal that hillmen should be required to take out a pass, and I fully concur with his views. In the first place it would be impossible to carry out the proposal, as far as the hillmen are concerned, without the aid of a very large and expensive establishment, and in the second it would be impolitic, for reasons already stated, to place such restrictions on the liberty of the hillmen. In addition I believe, as noticed by the Deputy Commissioner, that the local consumption of valuable timber by the hillmen is comparatively very insignificant."

74. As the Conservator of Forests, Bengal, is likely to visit the Chittagong Division during the coming cold season, and to see something of the forests, he will postpone expressing his final opinion on the subject until then. He will here only draw attention to one point. The Chittagong authorities appear to try and prevent the exhaustion of the forests by putting restrictions on timber-cutters. Now, it should be remembered that the forests

area is estimated at 5,670 square miles, and the highest annual outturn at 2,759 tons, or at the rate of about one ton for every two square miles—or, to put it still plainer, at the rate of one cubic foot of timber for every 25 acres of forest land. If such an outturn was likely to ruin the forests, then the sooner they are ruined the better, because they would not deserve existence. The real fact is that the annual export of timber at the present rate is quite irrelevant, the important point being that immense quantities of timber are destroyed every year within the Hill Tracts simply by *joom* cultivation; and the question whether reserves are to be formed or not, is synonymous with the one whether it is *possible or advisable* to prevent jooming or cultivation generally within certain well defined tracts. The Conservator, as mentioned above, will give his opinion on the subject after his visit to Chittagong, when the whole question might be reopened.

ASSAM DIVISION.

75. During the year under review eight tracts were selected for reserves, but they have not been gazetted as yet. The tracts declared reserves during the year are the following:—

I. The Kulsi plantation reserve.
II. The Baliparah reserve.
III. The Khaling Dooar reserve.

A further tract, the Nauduar reserve, has been approved of, but it could not be gazetted on account of the boundary between the Durrung district and the Akha Hills not having been fixed by the British Boundary Commissioner.

I.—*Kulsi Plantation Reserve.*

This reserve is situated in the Pantan mouzah, on the east bank of the Kulsi river, about 25 miles in a straight line south-west from Gowhatty.

(1.) *Area.*—

Sâl forest	= 2	square miles.
Area to be planted	= 3½	„ „
Total ...	= 5½	square miles = 3,520 acres.

(2.) *Boundaries.*—*West*, a line running from the boundary mound east of the village of Bahupur in a north-westerly direction to the southern extremity of the narrow chil running parallel with the river Kulsi from Bahupur to Jogibari, and thence, in a half-circle, east of the latter village, until it joins the Hati Khonda river north of Jogibari; thence along the right bank of the latter river up to the small feeder which connects it with the Andari chil; *north*, the small feeder which connects the Hati Khonda river with the Andari Chil, up to the cultivation of the Boglibari village and the southern boundary of this cultivation up to the Nia nuddy; *east*, the Nia nuddy from the paddy-fields of Boglibari to the paddy-fields of Balijuli; then a line round these fields and back to the Nia nuddy and up to the northern boundary of the cultivated lands of the Golia village; *south*, the northern boundary of the cultivated lands of Golia village from the Nia nuddy to the Kulsi river, to the boundary mound east of the Bahupur village.

(3.) *Topographical description.*—Low hills alternating with level and low lying pieces of ground, some of which contain pools of water.

(4.) *Soil.*—Sandy loam with vegetable mould on the hills and level ground, with granitic rock underlying it. Clay in the lower parts.

(5.) *Description of forest.*—The only tree prevailing in any quantity is sâl; there are here and there a few—

Sam	*Artocarpus chaplasha.*
Tun	*Cedrela toona,*

which are to be conserved.

(6.) *Timber Depôts.*—The depôt at Kukurmara, on the Kulsi, where the Assam trunk road crosses it.

(7.) *Timber markets.*—Goalpara, Bogribari, Serajgunge, and Dacca.

(8.) *Lines of export.*—Down the Kulsi to the Brahmaputra.

(9.) *Villages within the reserve.*—None.

(10.) *Rights of surrounding population.*—None.

(11.) *A map* of the reserve on a scale of two inches to the mile has been prepared by Mr. Aylmer.

(II.)—*Baliparah reserve.*

Situated in the Baliparah mouzah, on the western bank of the Baroli river, about 16 miles in a straight line north of Tezpore.

(1.) *Area*—

Mixed plain forest	50·30	square	miles.
Lower hill forest	29·50	„	„
Sâl forest	0·90	„	„
Savannah forest	7 14	„	„
Total ..	87·84	„	„

(2.) *Boundaries.—North,* the line fixed by the British Boundary Commissioner between the Akha Hills and British territory, from the Mansiri river to the Baroli river; *east,* the Baroli river, from the British boundary to the Meri village, and a survey line west of this village; *south,* a survey line running east and west from the Meri village to the Mansiri river; *west,* the Mansiri river, from the southern boundary to the British boundary.

(3.) *Topographical description.*—Partly lower hills and partly level ground.

(4.) *Soil.*—Alluvial clay and sand, with much vegetable mould on the level ground; a rich sandy loam or clay, with gravel underneath, on the higher ground.

(5.) *Description of forest.*—The better trees prevailing in the mixed plain forest are—

Ajhar	*Lagerstræmia Reginæ.*
Bola	*Marlea sp.*
Gomari	*Gmelina arborea.*
Poma	*Cedrela Toona.*
Koroi	*Albizzia odoratissima.*
Hingori	*Castanopsis rufescens.*
Makriah	*Schima Wallichii.*
Simul	*Bombax malabaricum.*
Jutili Duhong	*Altingia excelsa.*
Tualu	*Tetranthera monopetala.*
Roghu	*Nauclea cadamba.*

The better trees prevailing in the lower hill forests are the following:—

Sam	*Artocarpus chaplasha.*
Nahor	*Mesua ferrea.*
Jamu	*Eugenia manifolia.*
Gunseroi	*Camphora glandulifera.*
Hingori	*Castanopsis rufescens.*
Uriam	*Bishofia Javanica*
Tita sappa	*Michelia champaca.*

Besides these, there are rubber trees scattered through both this and the mixed plain forest, as nearly everywhere in the Durrung district, along the foot of the Himalayas. The sâl forest is on the whole very young and inferior, but for all that, on account of its position, very valuable, since it is the only sâl forest in the Durrung district, with the exception of a small patch still more inferior, about 30 acres in extent, and situated on the Mora Baroli river, seven miles from Tezpore. The forest owes its inferior condition to excessive and uncontrolled fellings in former years, and the constant fires, which overrun them annually. They are nearly pure, and there is no doubt that with care and attention they

will become very valuable for the district. The Savannah forest contains a sprinkling of the following trees:—

Ajhar	...	...	...	*Lagerstræmia Reginæ*
Koroi	...	...	...	*Albizzia odoratissima.*
Gomari	...	...	...	*Gmelina arborea.*
Simul	...	...	...	*Bombax malabaricum.*
Udal	...	...	...	*Sterculia villosa.*
Amluki	...	...	...	*Emblica officinalis.*
Roghu	...	...	...	*Nauclea cadamba.*

It was enclosed in the reserve with the view of raising sâl on it by natural reproduction, spreading of sâl-seed, and if necessary by planting.

(6.) *Timber depôt.*—Tezpore.

(7.) *Timber markets.*—Tezpore and other places on the Brahmaputra.

(8.) *Lines of export.*—Down the Baroli, which is fit for floating at all times of the year, to the Brahmaputra, also in the rains down the Mansiri and Sonai nuddies to the Brahmaputra. The Baroli joins the Brahmaputra about eight miles above Tezpore.

(9.) *Villages within the reserve.*—None.

(10.) *Rights of surrounding population.*—None.

(11.) A *map* of the reserve on a scale of two inches to the mile has been prepared by Mr. Fisher.

(12.) *Working plan.*—This is under preparation.

III.—*Khalingduar Reserve.*

The Khalingduar reserve is situated in the Khalingduar, and a small portion in the Bungomaduar, immediately at the foot of the Bhutan Hills, and between the Bhola nuddy on the east and the Nonai nuddy on the west, about 26 miles in a straight line north of Mangledai.

(1.) *Area.*—9·75 square miles.

(2.) *Boundaries.*—*North*, the line fixed by the British boundary Commissioner between the Bhutan Hills and British territory from the Nonai or Kulsi river to the Bhola nuddy; *east*, the Bhola nuddy from the British boundary to a boundary-mound marked A; *south*, a survey line running due west from the boundary-mound marked A on the Bhola nuddy to a boundary-mound marked B on the Nonai or Kulsi river; *west*, the Nonai or Kulsi river from the boundary mound marked B to the British boundary.

(3.) *Topographical description.*—Partly level ground and partly old river-beds.

(4.) *Soil.*—Alluvial with much vegetable mould; in the old river-beds sand and gravel.

(5.) *Description of forest.*—The forest on the level ground is lower hill forest with a considerable number of rubber trees scattered over it, which latter are of magnificent growth. The old river-bed is stocked with khair.

The better kinds of timber trees are the following:—

Sam	...	...	...	*Artocarpus chaplasha.*
Nahor	...	...	...	*Mesua ferrea.*
Ajhar	...	...	...	*Lagerstræmia Reginæ.*
Poma	...	...	...	*Cedrela toona.*
Gunseroi	...	...	...	*Camphora glandulifera.*
Titasappa	...	...	...	*Michelia champaca.*
Parelli	...	...	...	*Bignonia chelonoides.*
Roghu	...	...	...	*Nauclea cadamba.*
Hulluk	...	...	...	*Terminalia paniculata.*
Khair	...	...	...	*Acacia catechu.*

The forest is well stocked with timber, and will shortly be the only source whence timber can be supplied to the Mangledai sub-district, where the want of wood for burning, and charcoal, is already being felt.

(6.) *Timber depôts.*—None at present, hereafter one might be established at Bengbari.

(7.) *Timber markets.*—The Mangledai sub-district.
(8.) *Lines of export.*—Down the Nonai nuddy to the Brahmaputra.
(9.) *Villages within the forest.*—None.
(10.) *Rights of surrounding population.*—None.
(11.) A *map* on the scale of two inches to the mile has been prepared.

76. During the year valuation surveys were made in the Deboka and Kolahat reserves by Mr. Condon, from which the following contents of these forests have been calculated:—

Deboka reserve.—Area of sâl forest = 355 acres.

	Sâl.	Jamu.	Sonaru.	Gomari.	Khair.	Poma.	Sam.
Seedlings	15,930	4,748	334	150	17	30	47
Saplings	2,338	928	71	20	10	37	3
Young trees	163	58	10	17	.....	6	.....
Trees	13	.....	3	3	.....	13	.....
Old trees	.....	.....	.....	.....	.....	.....	.....
Total ...	18,444	5,734	418	190	27	86	50

Kolahat reserve.—Area of sâl forest = 1,465 acres.

	Sâl.	Jamu.	Sonaru.	Ajhar.	Khair.	Poma.
Seedlings	24,777	15,204	1,859	974	401	210
Saplings	2,688	4,121	212	312	471	25
Young trees	859	31	6	31	133	6
Trees	248	.....	.....	573	19	6
Old trees	.....	.....	.....	.....	.....	.....
Total ...	28,572	19,356	2,077	1,890	1,024	247

These figures show that both forests have been overworked, and what they require is rest for some time to come.

77. A very valuable piece of work has been done by Mr. Fisher in examining the concentric rings of 40 sâl trees. This is what was much wanted, and the collection of similar data will be proceeded with year after year. In the meantime it will be useful to see what results Mr. Fisher's countings, noted in Appendix VIII, give. The system of counting has been to ascertain the number of concentric rings corresponding with a girth of 18 inches, 3 feet, 4 feet 6 inches, and 6 feet. Countings have been possible in all the 40 logs up to a girth of 3 feet, in 25 logs up to 4 feet 6 inches, and only in 5 logs up to 6 feet. The trees were taken from the Pantan reserve in the Kamroop district, the locality being a low hill with level ground round its foot. Twenty-two of the trees grew on the hill, and eighteen in the level portion. Although the countings do not justify a final conclusion, still they seem to point to a few remarkable facts which it is worth while noticing here. The results stand as follow:—

	Number of concentric rings corresponding with a girth of—			
	1′ 6″	3′	4′ 6″	6′
On the hill	30	56	82	115
In the plain	32	65	96	126
Average	30	60	85	117

In the first instance, the growth during the younger years of the sâl tree is comparatively slow, whereas in the case of most Indian trees the reverse is the case. The reason for this is, the Conservator thinks, to be found in the fact

that young sâl trees in these forests suffer more from jungle fires than old trees. And again the growth on level land is slower than that on the hill sides. This, too, is most likely caused by jungle fires in the plains being much heavier than on the hills. In short, if the above data are correct, we find borne out by actual figures that the influence of jungle fires retards the growth of the trees considerably. Until the data have been further augmented, it may be assumed that the rate of growth of sâl in the Kamroop reserves is as follows:—

Girth.		Age in y(
1'6"	=	30
3'	=	60
4 6"	=	90
6'	=	120

The keeping out of fires would of course lead to a different rate of growth.

78. The demarcation of the Pantan, Borduar, and Kulsi plantation reserves in the Kamroop district, and all the reserves in the Nowgong and Durrung districts, has been completed during the year.

SECTION III.—PROTECTION AND IMPROVEMENT OF FORESTS.

79. As long as the Department in these provinces is occupied with the general inspection of the country with the view of setting aside certain areas as reserved forests, it is but natural that not much progress can be made in the work, which has to be reported on under this section. However a beginning has been made, and after another year or two measures for the protection and improvement of the forests in Cooch Behar, Assam, and Palamow, will be in full working order.

ESTABLISHMENTS.

80. During the year the Conservator submitted separate reports showing the total insufficiency of the protective establishments sanctioned for the Cooch Behar and Assam Divisions, and asking for an increase, besides an entirely new scale for Palamow. The proposals did not receive the sanction of the Government of India in the first instance, but subsequently the Financial Department sanctioned the budget provision for 1873-74, based on the proposed scale of establishment, as far as Cooch Behar and Palamow are concerned. The Department of Agriculture, Revenue and Commerce, hereupon inquired whether the changes proposed by the Conservator might not be carried out under the circumstances, and the Government of Bengal sanctioned, as a special case, the employment of an enlarged establishment according to the Conservator's discretion, and within budget limits, for the first six months of 1873-74, under the condition that final proposals will be submitted before the end of September 1874. A new scale of subordinate establishment is now under consideration, and it is hoped will be sanctioned before the end of the current financial year.

81. With the few watchers formerly sanctioned for Cooch Behar, it was quite impossible to protect the forests, and a very large amount of mischief was done; but since the increased establishment has been employed, it has been possible to apprehend the evil-doers, and several heavy punishments have been awarded by the regular courts for theft of timber and offering bribes to Government officials. These will be reported on in next year's report.

82. For *Palamow* an establishment of—

1 Ranger	on Rs. 100	per month	...	...	Rs. 100
1 Peon	„ „ 6	„ „	...	...	„ 6
14 Watchers	„ „ 6	„ „	...	...	„ 84
		Total per month	...		Rs. 190

has been allowed, and the forests (178 square miles) will be taken under management during the coming cold season.

83. The establishments for the *Assam* forests are still under discussion, and in *Chittagong* no changes have been made during the year.

BREACH OF FOREST RULES.

COOCH BEHAR DIVISION.

84. Five prosecutions have been instituted during the year, and four convictions obtained. Four were cases of petty theft; the fifth was, however, an important case, namely the cutting and partly removing of 100 sâl trees from the Sukna forest. The perpetrator is one Nakul Sing, a native of Nepal, who worked as a timber contractor for the Public Works Department. It appears that the Executive Engineer of Darjeeling district entered into a contract with Nakul Sing for the delivery of the timber at a rate below the usual market price. Nakul Sing proceeded to the Government forest, cut 100 sâl trees up into beams, which he began to transport from the Government forest, first into some adjoining private forest, and from the latter to the Silligori Darjeeling cart road, thus making it appear as if the timber came from the private forest. After he had taken away and delivered to the Public Works Department some 30 pieces, the theft was discovered by Mr. Gamble, and about 70 fine beams seized in the forest. The matter was at once put into the hands of the police, but before Nakul Sing could be arrested he had decamped into Nepal The police investigated the case at some length, but nothing has come of it; the Conservator being informed that the inspector of police was suddenly transferred to famine work, and his successor failed to take up the threads of the investigation. The forester in charge of the Sukna range was on leave while the theft took place, and there is some suspicion that the man who officiated for him temporarily, as well as the watcher, took bribes; but nothing could be proved against the two men. In a pecuniary point of view the Department has not suffered a loss, since the converted timber seized has been sold for more than the standing trees would have been sold for at the ruling rates.

CHITTAGONG DIVISION.

85. The Commissioner writes as follows:—

"The following remarks made by the Assistant Conservator are also worthy of notice, and are here extracted in full. Proposals are now under consideration to strengthen the toll collections and prevent parties from illicitly and forcibly taking down forest produce without paying the Government toll. I consider it would be advisable, where persons are caught taking forest produce past a toll-station illicitly, to make the penalty double payment of tolls

"I have asked the Assistant Conservator, in consultation with the Deputy Commissioner, to draw up a set of rules on the subject, such as contemplated by the law, for approval. It is absolutely necessary that some rules should now be drawn up and promulgated under clause 2, section 4 of the Forest Act, as much inconvenience and difficulty has been already experienced owing to the frequent evasions of tolls which have lately occurred."

ASSAM DIVISION.

86. In the reserves of this division 7 cases, in which 14 persons were concerned, were brought before Magistrates, and 2 convictions obtained. On the whole there is little trespass in the Assam reserves.

FIRE SUPPRESSION.

87. No one, who has not seen the grass and the jungle fires in the north-eastern forests of Bengal, especially in the terai, has an idea of the height and density of the former, and of the violence of the latter. Except immediately after the jungle fires have cleared the ground, it is impossible to enter the sâl forest without an elephant who forces a path through the

dense mass of grass and jungle. Even then it is frequently impossible to see the forest, because the grass reaches such an immense height. To keep out fires from such forests is no small undertaking, and similar operations in northern and central India appear to be mere child's play compared with it. Mr. Baden Powell, late Officiating Inspector-General of Forests, who has seen something of similar operations in other parts of India, was present when an attempt was made to burn a fire-path round the Sivok sâl forest in the Darjeeling terai, and great was his surprise and astonishment at the exhibition. It is not to be wondered at, then, if our first efforts of protecting these forests against fire should not be very successful. However in a few instances we have succeeded, and we trust to succeed more and more every year.

COOCH BEHAR DIVISION.

88. *The Bamunpokri plantation* has been successfully protected by a fire-path of upwards of 150 feet broad.

89. An attempt was made to burn a 300-feet fire-path on the south boundary, where the fires come from, of the *Sivok sâl forest*, covering an area of 1,554 acres, but the second day a sudden gust of wind carried the fire over the path, which had been cleared on the side of the forest, burning a portion of the forest. Subsequently other fires passed the fire-paths, and the final result is that almost the whole forest has been burnt.

90. On the other hand the *Muraghat sâl forest*, comprising an area of 12 square miles, has been successfully protected by a path, with the exception of a small portion of the Savannah forest. This reserve is bounded on the east and west by water-courses, so that only on the north and south paths of about 4 miles in length had to be cleared. Mr. Johnston, who conducted the work, reports his operations in the following words:—

91. "On the morning of the 13th January I proceeded to the Nonai river, the western boundary, and commenced preparing the southern fire-path in the following manner. By means of triangles constructed of bamboos or any other light material, the coolies pressed down the jungle, thus forming an intervening space of about 30 to 40 feet in width between the jungle intended to remain standing and that intended to be fired. Besides this 30 to 40 feet intervening space, I ordered a space 6 feet wide and about 10 feet distant from the jungle intended to remain standing, to be cut and cleared of every description of jungle and inflammable matter, and had this 6 feet space even carefully swept, as it was the ground fire I feared would be the most dangerous. I was thus engaged during the 13th and 14th, when I reached the Ghairkhuta, the eastern boundary.

92. "The 16th I commenced firing the jungle south of this fire-path. I got to work about 10 A.M., that is as soon as the jungle allowed of being fired, and worked from the Nonai river in an eastwardly direction towards the other or eastern boundary. The wind was blowing nearly due south, so I was obliged to be very cautious. Having seen that the coolies were all supplied with thickly foliaged branches, for the purpose of beating out the fire when necessary, I commenced firing—not immediately the standing jungle, but the jungle which the men had pressed down immediately south of the 6 feet cleared space. All went on successfully until about 1 P.M., when the wind increased with a sudden gust, and blowing as it was from the south, it caused the ground fire to cross the 6 feet cleared space, thus igniting the jungle intended to remain standing and entering the forest about 200 yards at the deepest place.

93. "The 17th I went to work between the Garati and Ghairkhuta rivers, and first of all increased the space intervening to 70 feet, besides having the 6 feet wide space carefully cleaned and swept. After firing the jungle, all seemed to be going on well until one of the coolies, who was left behind to give the alarm if needed, was heard summoning hands to his assistance, and on proceeding with some men found that the head-fire had crossed. However, by means of the men we managed to beat it out before it had gone more than 100 or 150 feet into the forest, and before the fire had reached any of the trees.

Thus, notwithstanding a 70 feet intervening space, the fire was carried over, about one-fourth of a mile distant from where the main body of men were working; and if it had not been that the jungle where the fire did cross was somewhat green, it is hard to say how far the same might have gone.

94. "The wind was, and is always during the day, from the south; whereas at night immediately after sunset it changes and comes down from the north. This is invariably the rule, and is a most serious obstacle to any one making fire-paths. However all went on well after that, although I was at times rather uneasy how it would end, having to work with such a contrary wind. After firing this space I, on account of the contrary wind, was obliged to force the fire by sending men some distance into the jungle with fire-brands, but was obliged to be very much on the alert, as the flames in places seemed to threaten to cross my path. I then got the southern fire-path completed, and moved camp on the 19th four miles further north for the purpose of constructing the northern fire-path. Here I went to work in the same way as I did at the southern fire-path, except that I made the intervening space only 40 feet wide, having a much more favourable wind to work with, notwithstanding which, the fire did cross my path, the wind suddenly shifting; but by the aid of the coolies I was able to beat it out before it had got further than 10 yards. Up here, north, I found that jungle-fires, which seemed to have taken place about 16 days before my operations, judging from the length of the new growth of grass-jungle, had already crossed the intended northern boundary; but on inspection I found that the course taken by the fire had not done any very considerable mischief to the sâl forest. I finished the northern fire-path, without anything else worthy of note occurring, on the 23rd."

95. The jungle-fires have this year been exceedingly strong and fierce all over the division, owing to the early stoppage of the rains and the consequent extreme dryness of the grass. They began in December, or nearly two months before the usual time.

ASSAM DIVISION.

96. Attempts were made to protect the Pantan, Borduar, and Matiakar sâl reserves, comprising 12, 23, and 3½ square miles respectively, and situated in the Kamroop district, against fire, by clearing paths and burning the grass all round where they were not naturally protected by water-courses. Extra watchers were temporarily employed; but about the middle of March fire was lighted by villagers near the northern boundary of the Borduar reserve, which was carried into the reserve and burnt about half of the Borduar and Matiakar reserves in spite of the endeavours made by Mr. Aylmer to extinguish the fire. Of the Pantan reserve only a very small portion was burnt.

97. In the Nowgong district similar measures were taken, and fires partly kept out of the Kolahat reserve, area = 7½ square miles; but the Deboka reserve, area = 3¼ square miles, was set on fire maliciously and burnt. The perpetrators were apprehended, prosecuted, and sentenced to imprisonment.

98. In the Durrung district the Balipara reserve, area 70 square miles, was set on fire by shikaries, who were apprehended and prosecuted; but the case was dismissed because an hour had elapsed before the forester and watchers got up to the men. Although the men were found with lighted sticks in their hands, Mr. Mann reports, the Magistrate did not consider this conclusive proof that they had set fire to the forest.

99. The other reserves in Assam are evergreen forests, and they are not overrun by jungle-fires.

SECTION IV.—PLANTATIONS.

100. To report progress on the plantation operations undertaken in Bengal is not altogether a satisfactory occupation. By the orders of Government our chief efforts have up to date been directed to the growing of teak beyond its natural northern limit in a climate doubtfully damp and cold, and to the propagation of India-rubber in a manner different from that indicated by Nature. If to this is added that we have on our hands some plantations

spoilt in former years, it may readily be understood why much money is being spent and comparatively poor results obtained. In last year's report a detailed description of all the plantations has been given, and the Conservator limits his remarks therefore to what has been done during the year, and to recording the experience gained during that time. The area planted on the 1st April 1873 amounted to 622 acres, and during the year 301·5 acres have been added. According to species of trees there are—

		Acres.
Plantations of	temperate trees	450
„ „	conifers	42
„ „	teak	190½
„ „	teak, toon, and sissu	11
„ „	sissu	10
„ „	India-rubber	215
„ „	fruit-trees	5
	Total ..	923½

COOCH BEHAR DIVISION.

101. *Rangbul plantation.*—This plantation of temperate trees is situated half a mile from Jore bungalow, and in consequence it is very much exposed to damage by cattle. Moreover a considerable number of cattle, kept by some people living in the old Senchal barracks, are constantly straying into the plantation. Efforts were made to keep the cattle out, but they failed; and towards the end of the year arrangements had to be made to put a fence round the plantation of 450 acres, which has been completed since at a considerable cost. The effects of this measure are visible already, and the oaks and magnolias have taken a fresh start. The plantation is now fairly covered with small brushwood, and with the view of increasing the number of valuable trees, several thousands of walnut-seedlings have been raised in a nursery, which will be planted out during the year 1874-75. Arrangements have also been made to raise large quantities of champ (*Michelia excelsa*), and lal champ (*Magnolia Campbellii*), in order to cover the ground cleared in former years in the Rangbul range. The expenditure during the year amounted to Rs. 209-0-9.

102. *The Dhobee Jhora pine-plantation* has been protected during the year, nothing else being required at present.

103. *Bamunpokree plantation—Teak and Toon.*—During the year this plantation has been surveyed by Mr. Gamble, and a plantation record, according to the instructions published with last year's report, prepared; parts I and II of which, with the map of the reserve, will be found in appendix IX.

The plantation reserve comprises an area of 1,367 acres, of which 1,300 are fit for planting. It has been divided into five blocks, according to the peculiarities of the ground. Blocks I, II, and III, comprising an area of 741 acres, are to be planted with teak and toon, and blocks IV and V, comprising 626 acres, are to be interplanted with toon only. On the 1st April 1873 the following areas were under plant:—

Block I,	compartment 1,	sub-compartment	*a* =	8¾ acres	= teak of 1868 and 1871.
„ I	„ 1,	„	*b* =	33½ „	= „ „ 1872.
„ I	„ 2,	„	*a* =	5¾ „	= „ „ „
„ I	„ 3,	„	*a* =	10 „	= „ „ „
„ II	„ 1,	„	*a* =	11 „	= teak, toon, and sissu of 1871.
	Total	...		69	

During the year 1873-74 the following areas were added:—

Block I,	compartment 2,	sub-compartment	*b* =	16½ acres	= teak of 1873.
„ III	„ 1,	„	*a* =	6 „	= „ „ „
	Total	...		22	
	Grand Total	...		91	

The area III 1 *a* was planted by special orders of the Government of Bengal.

The 1868 and 1871 plantations were fairly stocked, and nothing has been done in them during the year except protecting them against fire. Some of the largest trees in the 1868 plantation lost their top shoots, but up to date nothing decided can be said as to the ultimate effect of this phenomenon. The 1872 plantation was only about half stocked with sickly and small teak-seedlings.

104. On the 2nd May 1873 the whole plantation was transferred from the Cinchona to the Forest Department. Mr. Gamble, the officer in charge, in the first instance filled up the vacancies in the 1872 plantation by planting 12,360 nursery teak-seedlings into it. In accordance with instructions received from the Conservator of Forests he made an extension adjoining the 1872 plantation by sowing teak in spots four feet apart either way, but only in every alternate seed-hole; it being intended to plant the intermediate spots with toon-seedlings. Nurseries of the last-mentioned species were laid out in addition to auxiliary nurseries of teak. While thus employed, and while the Conservator was absent on duty in Assam, the Bengal Government, on suggestions made by Dr. Henderson, then Officiating Superintendent, Botanical Gardens, Calcutta, issued orders direct to Mr. Gamble to commence a second plot of teak-plantation on the hillside, and to establish 20 acres of rubber-plantation on the Bamunpokree spur. The planting season was then far advanced; however, Mr. Gamble acted on these direct orders, which of course upset the arrangements made by the Conservator before his departure for Assam. In the desire to carry out the Government orders and establish the new plots of the plantation, the old plantation of 1872 was neglected for want of labour, the grass in it growing up to a fearful height. When the Conservator became aware of all this towards the end of June, he immediately sent orders first to take care of the old plantation before establishing extensions. Additional labour was not to be had at that time of the year, and the result was that the growth of grass and jungle in both the old and new plots became quite uncontrollable. To this should be added the scanty rainfall of the year, which prevented most of the teak-seeds from germinating, and the result can easily be imagined. The Conservator examined the plantation on the 18th October 1873, and found to his dismay that almost all plants in the 1872 and 1873 plantations had been smothered by grass and many killed. The 1872 plantation was fairly stocked, but most of the seedlings looked very miserable; in the 1873 plots there were hardly any seedlings at all, but a number of transplants were doing fairly well, though smothered by the grass. The attempts to raise toon were limited to a number of seedlings in the nurseries, and a few in the 1873 plantations. Thus we have another illustration showing the effects of a change of programme in the middle of the planting season.

105. (2) *Mahogany.*—Fifty mahogany-plants, received from the Superintendent, Botanical Gardens, Calcutta, and planted out amongst the teak of 1872, have grown well, indeed they look very promising up to date.

106. (3) *Baobab.*—A few baobab were also planted, but most of them have died again, and those remaining have made very little progress.

107. (4) *Rubber-plantation.*—Dr. Henderson submitted early in May 1873 proposals for the formation of rubber-plantations in Bengal, upon which the Government of Bengal ordered the Conservator of Forests to carry out Dr. Henderson's suggestions, and to establish experimental plantations, sending these orders at the same time direct to Mr. Gamble. This officer established 12 acres of plantation according to Dr. Henderson's system, and the result is a total failure. The plot of ground selected is situated on the Bamunpokree spur, in the terai, at an elevation of about 1,000 feet above the sea. The soil is very rich and fairly covered with high timber forest, giving a moderate shade. The rubber-cuttings were about one foot long, of different diameter, and planted about two-thirds of their length into the ground, ten in each tally, the latter being 30 feet apart each way, or about 48 per acre. The total number of cuttings planted amounted to 5,760. The planting was commenced on the 27th June. At first the cuttings struck pretty freely, so that 1,130 had taken root and sent

out leaves on the 26th August; but in September, when the rains ceased, the cuttings began to show signs of dying off again. On the 20th November only 339 were found alive, and on the first April 1874 only six remained.

108. It is difficult to explain this failure. The shade overhead can hardly have been the cause, because the plantation at the Kulshi, in Assam, failed in the same way, although there lines had been cleared so as to leave only side shade. Mr. Gamble further thinks that want of moisture has nothing to do with it, as a number of cuttings failed although planted in almost marshy ground.

Mr. Mann, in charge of the Assam forests, is of opinion that the cuttings had not sufficient time to establish themselves before the rains ceased, and he proposes to plant the cuttings in February instead of May or June, and with this view the Conservator agrees.

109. The expenditure during the year stands as follows, irrespective of the cost of the rubber-plantation experiment, the area of which has not been brought on the books:—

	Rs.	A.	P.
Expenditure belonging to the year	4,858	1	9
„ „ to 1872-73	1,143	13	9
Total ..	6,001	15	6

110. The Conservator of Forests, in considering the steps to be taken in this plantation in 1874-75, resolved upon not attempting an extension, but arranged for the proper filling up of the 91 acres under cultivation. Accordingly early in 1874 extensive nurseries of toon and teak were established, the vacancies in the 1872 plantation filled up with toon chiefly, and those in the 1873 plots with alternately teak and toon. This work will be completed by the end of August 1874. At the same time the plantation has been kept clear of grass and jungle throughout the growing season, which has had a very beneficial result upon the plants. The cost of clearing grass however, is very heavy, its growth being so extremely rapid. In 1875 we shall then be able to make a new start by planting an additional piece of ground with teak and toon mixed.

111. *Mahanuddy and Gulma plantation.*—As indicated in last year's report, these two small experimental rubber-plantations have turned out failures, and nothing need be said about them, except that their area has been struck out of the statement of plantation area.

112. The same may be said of the *Ramshai Hat* experimental teak-plantation, though a few plants are still growing.

113. Regarding the *Fallacotta* experimental teak-plantation, Mr. Gamble reports as follows:—

"This plantation, which the Conservator has already stated to be utterly unsuited for the growth of teak, was visited by myself in March 1874. The trees were nearly all attacked with rot at the base of the stem, many of them having actually fallen down;—in fact, the whole appearance of the plantation was very bad. A few sissu-trees planted with teak seemed to grow pretty well, but even they could hardly be expected to prosper in a country so utterly devoid of trees of any kind as that round Fallacotta." This plantation may be kept on record for the present.

114. A few *deodar* seeds obtained by Mr. Gamble from the North-Western Provinces germinated freely, but most of the seedlings have died again.

115. Two batches of *the sweet chestnut*, usually called the Spanish chestnut, were received from the Secretary of State for India. About half of these were packed in paper and half in coal-dust. The seeds were sown partly at Rangirum, partly at Moungpu, and a few at Bamunpokree. Of those packed up in paper, only 18 germinated; and of those sent in coal-dust, 87. The chestnuts were sent to the Conservator at Calcutta, who had no previous information whatever of their coming. Unfortunately they arrived when the Conservator was absent on tour, and in this way some delay arose. Had the chestnuts been sent straight from Europe to the Assistant Conservator at Darjeeling, I have no doubt some thousands of seedlings might have been obtained, as many had germinated

on the way out, and of course died again. Dr. King, the Superintendent, Botanical Gardens, Calcutta, is of opinion that sweet chestnuts should be obtained from Italy, so that they may be packed in a dry climate. With this view the Conservator agrees; but he thinks it is equally important that previous notice be given of the intended day of despatch, and that the seeds be sent straight to the officer who is to sow them.

CHITTAGONG DIVISION.

116. The Commissioner writes as follows:—"The sites on which plantations of teak have been commenced are Pahartulli, near the station of Chittagong.; Sitapahar; and Holingamara, in the Hill Tracts, on the river Kurnafoolie. A few seeds were also sown near Kassalong, but these did not germinate. Plantations have not been continued on the Pahartulli site owing to the damage caused by cattle breaking through the fencing. The surrounding villagers," the Assistant Conservator reports, "made a point of doing as much mischief as possible at night to the young plants, which they looked upon as likely to grow up and shut out their pasturage.

117. "At Sitapahar the area taken up is about 11 acres. Of this area ten acres had been planted up to the close of the year under report, at an aggregate cost of Rs. 629-12-6, or nearly Rs. 63 per acre. At the end of 1872-73, 2,130 plants were alive at Sitapahar, and 8,900 plants were put out during 1873-74, giving a total of 11,030 plants in the ten acres.

118. "At Holingamara 100 acres were prepared for the reception of teak-seedlings in 1872-73, but owing to a reduction of the original budget estimate of Rs. 6,000 for plantations to Rs. 1,000, only 58,710 seedlings were planted out during the year over an area of about 48 acres. The expenses incurred on this plantation amounted to Rs. 1,718-15-7, or to nearly Rs. 35 per acre.

119. "The total expenditure during the year on the Sitapahar and Holingamara plantations amounted to Rs. 1,945-14-4, whilst the number of plants put out last season aggregated 67,610.

"It has not been possible," the Assistant Conservator states, "to count the number standing lately, as the jungle has been allowed to spring up to afford shelter during the hot months."

120. "The following remarks regarding the mode of plantation, and the appearance of the plants have been extracted from the Assistant Conservator's report:—"The plan of forming several nurseries conveniently apart and sowing the seed broadcast was followed; and as soon as the plants were about four inches high, they were transplanted and placed out six feet apart.

"Ten maunds of seeds were imported from Burmah; and judging from the profuse manner in which they germinated, their quality must have been exceptionally good.

"The greatest planting difficulties encountered last season were the short rainfall and scarcity of labour. The last was in a great measure caused by the reputed unhealthy nature of the Hill Tracts during the rains, and the sick-list all through supported the bad reputation of the place, at one time there being as many as 35 sick out of 50 men.

121. "In the Sitapahar plantation, I regret to say, several trees have been attacked by an insect called by the natives "korath." It has generally entered the tree at the lowest node and worked its way into the heart, making the node increase in size. About a dozen trees have fallen from this cause, and I am at a loss to know how to treat the subject or account for the existence of the insect.

"The appearance of the plants on the whole, including even those attacked by insects, is good. The injured ones continue verdant and outwardly healthy up to the time they fall; the only symptom of disease is the swelling at the lower node, where attacked. The plants of 1871-72 now stand on an average from 20 to 25 feet; those of 1872-73, from 10 to 16 feet; and last year's are now just starting into growth after their dormant spell, and stand about 1 to 1½ feet high.

122. " From the past three years' experience, I have found that young teak thrives best on high flat or undulating land, and in a sandy loam. Unfortunately most of the river frontage of this description on the Kurnafoolee has been allotted for plough-cultivation, and we shall therefore have to content ourselves with whatever land is available bordering on the river. The results may be less satisfactory ; but I think formation of artificial forests should be confined to land not required for cereal crops, and that it is preferable to raise one tree on worthless soil than ten on good, even though the cost of one should equal that of the ten.

123. " With last season's plants a crop of paddy and cotton was put in on a small scale, more to test, for the benefit of the hill men, whether any injury from it would result either to the teak or the crop ; the object of this experiment being an attempt to obtain the co-operation of the joomeahs hereafter to put in teak-seedlings with their jooms, which, when abandoned by them for other jooms, would leave a number of teak-plants on them. These would have to be kept clean by ourselves the second year, and then allowed to get on by themselves.

124. "On the proposal of sowing young teak-plants in deserted jooms, the Deputy Commissioner states, that the 'joomeahs will thereby be debarred from cultivating that particular land again. It is at present the custom to allow the land to remain fallow for a period, which varies from three to ten years ; then to cut down and burn the jungle which has grown upon it in the meantime, and cultivate it for one season. Some spots are more valuable than others on account of their accessibility or fertility ; and it will be found that what is most suitable for teak-forest is also most suitable for jooming. I do not wish to make too much,' the Deputy Commissioner adds, 'of this objection, but I advance it because I think there is a remedy. Numbers of joomeahs are now becoming plough-cultivators; but till their land is cleared sufficiently to afford a crop which will give them food for the whole year, they are obliged to cut jooms of greater or less extent. There can be no objection whatever to utilizing such jooms, and the owners are exactly the class over whom we have the most direct authority.

125. " ' As regards the lands taken for plantations, I have to note that my predecessor has already pointed out to the Assistant Conservator that it is not desirable, looking to the probable future extension of plough-cultivation in the plains of the Hill Tracts, to occupy the richest and best drained valleys with young teak-plantations, however favourable such lands may be for them ; but that broken and hilly ground, not likely to be required for tea or cotton should be selected, provided always that it is within easy reach of good water-carriage.

126. " ' During the past year my predecessor, Mr. Hankey, procured some mahogany-seedlings from the Superintendent of the Botanical Gardens, Calcutta, and sent 25 of them to the Assistant Conservator, who, as it will appear from the following extract from his report, was not very successful with them. A futher supply has been obtained from the Botanical Gardens, Calcutta, since the close of the year, and has been sent to the Assistant Conservator for further experiment. There are, I observe, several fine mahogany trees standing in this station, and they appear to flourish here as well as they do at Calcutta.

127. " 'Regarding the mahogany-seedlings above referred to, the Assistant Conservator writes thus:—During the year twenty-five mahogany-seedlings were made over to me in a small brandy-case, and it immediately struck me that with three inches of soil to provide nourishment to seedlings about 18 inches in height, there could be very little chance of removing the plants out of the box and fixing them into the ground without losing most, if not all. To give them a chance, however, I at once proceeded to place a larger box filled with the most attractive leaf mould under the box in which the plants were, and then very carefully removed the bottom of the seedling-box; but with all the care and attention I could bestow, most of the plants at once began to droop and die away, and only eight survived this ordeal. The bottom of the brandy-case

showed that the tap-roots had regularly furrowed it, and subsequently when I put out the surviving seedlings I found, on examining the dead plants, that they had tap-roots quite as long as their stems and contorted into every imaginable shape and form, whilst they scarcely possessed any lateral roots. Two of the seedlings have been planted at the Holingamara teak-plantation; they appear very healthy and stand about three feet high: six were planted at Rangamutti, of which two appear to have died, and the remainder are thriving very well, the smallest being about two feet, and the highest four feet.

128. "The Assistant Conservator also reports that he procured a seedling of *ficus elastica* or caoutchouc-tree, and a few cuttings from Demagiri in the Hill Tracts, and planted the seedling at Holingamara under the shade of bamboos with grass thatching. The plant is expected to thrive, but the cuttings are reported not to have taken root owing to adverse weather.

129. "'Before quitting the subject of plantations, it may be mentioned that, as a set-off to the expenditure of Rs. 1,945-14-4 on the plantations during the year, Rs. 134-2-6 were realized by the sale of 228 maunds of paddy, 6 arees 5 seers of teel-seed, and 11 maunds 16 seers of cotton, being the produce of the paddy, teel, and cotton-seed put in with the teak-plants, as mentioned above in paragraph 32.'"

ASSAM DIVISION.

TIMBER-PLANTATION.

130. *The Kulsi plantation* consisted on the 1st April 1873 of eight acres of teak; during the year 25 acres of teak and 10 acres of sissu have been added: so that the total area stands now at 43 acres under plant.

131. *The teak-plantation of* 1872-73 has been kept clear of grass and jungle during the year at a cost of Rs. 124-8-6, or at the rate of Rs. 15-9 per acre. The growth of the young trees has been vigorous. When examined in February 1874, the seedlings had reached the following size:—

Average height	..	..	..	.. 6·6 feet.
Average girth	..	..	..	.. 3·6 inches.

Mr. Mann reports, however, that a borer has been observed during the rains of 1873. It attacks the young trees about a year old near the base of the stem, and after eating the wood immediately under the bark, makes its way into the pith and causes a swelling in the bark on the place attacked. The leaves of the plants attacked become limp and yellow, and the seedling eventually dies off above the place attacked. In this way about 21 per cent. of the teak-seedlings at Kulsi have been attacked in 1873. However, after having been cut off just above the ground, they sent out vigorous shoots; so that on the whole but few vacancies have been caused. During the cold weather of 1873-74 the borer disappeared entirely, but it has to be seen whether it will return this year or not.

132. *The extension of teak* (= 25 *acres*) was commenced in April 1873. By the end of June the clearance had been completed, the planting spots prepared, and the seed sown at stakes, some at six feet by six feet, some at six feet by three feet, and some at four feet by four feet, four seeds being put down at each stake. The seed sown was chiefly procured from Burmah; but some Assam seed had also been collected, which turned out a failure, it having probably been gathered before it was ripe. It was intended to have three acres planted with teak and toon alternately; but as the toon-seed did not germinate, the whole area was planted with teak only. On account of the lateness of the season when this year's extension was commenced, some of the land was not hoed before the seed was put down, and the consequence was that the subsequent weeding and hoeing became unusually expensive and troublesome. Up to the end of August the vacancies were filled up with seedlings; and after these had all been used, the remainder were filled up with seed, some of which did not germinate until the spring of 1874.

The general condition of the plantation is satisfactory. From countings made in February 1874, the following percentage of vacancies has been calculated:—

Average number of plants thriving	83 per cent.
„ „ „ vacancies	17 „
Total ...	100

The expenditure of the extension amounts to Rs. 1,536-9-6, or Rs. 61-7 per acre, exclusive of cost of establishment, tools, buildings, roads, and boundary-mounds. The total expenditure on the Kulsi teak-plantation during the year amounts to Rs. 2,196-7-11.

133. *The sissu plantation.*—At the end of June 1873 ten acres of land situated on the left bank of the Kulsi, outside the reserve, were cleared. The land is particularly well-suited for sissu, it consisting of sandy alluvial soil deposited by the Kulsi. The sissu was sown in nurseries in May 1873, and transplanted six feet by six feet on planting spots prepared like those for teak—that is to say, by taking out about one cubic foot of soil, breaking it up and replacing it. The early cessation of the rains caused some of the seedlings to die, but on the whole the experiment is fairly successful. On the 19th February Mr. Mann found on the average—

Plants alive	70 per cent.
„ failure	30 „
Total ...	100

The seedlings look very healthy, and vary in height from one to two and a half feet. The total expenditure on sissu during the year amounted to Rs. 481-7-8, or Rs. 48-2 per acre.

134. *Makum teak-plantation.*—This plantation comprised on the 1st April 1873 the following area:—

Teak of 1869	1 acre.
„ „ 1871	1 „
„ „ 1872	2 „
Total ...	4 acres.

During the year 1873-74 seven acres were added, so that at the end of that year the total area amounted to eleven acres. Mr. Mann examined the plantation in January 1874, and reports on its condition as follows:—

Teak of 1869—

Average height per tree	27· feet.
„ girth „ „	12·3 inches.

The area is well stocked, the growth vigorous, but there is still the tendency to send out strong side branches instead of top shoots. A few have been attacked by the borer.

Teak of 1871.—Average height per tree—14 feet; area fairly covered; growth vigorous.

Teak of 1872—

Plants alive in per cent.	40
Failure	60
Total ...	100
Average height per tree	5·7 feet.

Teak of 1873.—The sowing of the seed was commenced on the 23rd of June and continued to the end of August. An auxiliary nursery was also established. Mr. Mann found the plantation in January 1874 in the following condition—

Plants alive in per cent.	35
Failure	65
Total ...	100

135. The Conservator of Forests visited the Makum plantation in July 1873, and his observations on it will be found in last year's report. Finding strong indications that teak on level ground in Upper Assam will not thrive ultimately, and with the view of ascertaining whether it will do better on undulating ground, he suggested that a small experiment should be made on the undulating ground between Jaipore and Makum. This was done at *Tippun Hill*, opposite Jaipore. Half an acre was sown in the middle of July, and vacancies filled up in the end of August. In January 1874 the seedlings were found to be very feeble, though the soil was good :—

There were plants alive in per cent.	59
Failures	41
Total ...	100

Both the Makum and Tippun Hill plantations have been fenced in, and no extension is contemplated. They are to serve as experiments to show whether teak will thrive in upper Assam or not. The expenditure during the year amounted to Rs. 549-3.

RUBBER-PLANTATIONS.

136. As Mr. Mann had great opportunities for studying the habits of *ficus elastica*, the Conservator will give his report under this head *in extenso* :—

"An experimental rubber-plantation of about 18 acres in extent was started in June 1873 on the right bank of the *Kulsi* river, in the Kamroop district, thirty miles west of Gowhatty.

"As pointed out at the time when the Government order regarding these plantations, based on Dr. Henderson's suggestions, reached the Commissioner of Assam, and the matter was discussed with the Conservator of Forests, Bengal, at Shillong, the season had so far advanced that success was hardly possible.

"Still as it was desirable not to lose any time in making the experiment, even though it had to be done under unfavourable circumstances, a commencement was made in clearing lines ten feet in width in a mixed plain forest 15 feet a part, and putting out branches on these lines at distances of 15 feet.

137. "The Kamroop district south of the Brahmaputra is not particularly well suited for the growth of the rubber-tree, it being a dry district compared with the land north of the Brahmaputra and along the foot of the Himalayas.

138. "All rubber-trees in the neighbourhood having been more or less weakened by excessive tapping, only scrubby and very poorly grown branches were procurable at first for the cuttings, and these nearly all died within a month. Further searching for better and more vigorous branches proved so far successful, that by the middle of August all the former ones which had died were replaced, and these looked very hopeful for a short time, until the continued drought and the early cessation of the rains caused them gradually to die off.

139. "The summer months are not the proper time in Assam for the propagation of the rubber-trees, since they are then in full growth and the branches get very much disturbed by the cutting at this season.

"These circumstances combined caused this first experiment to become gradually a failure, which however would not have happened had the last year not been such an exceptionally dry one.

"The plantation was first inspected in July 1873, and showed then in that portion where scrubby branches had been used 33 per cent. of failures; whilst in that portion where more vigorous branches had been put in, only 2 per cent. of failures existed at that time.

"At the end of August the plantation was again inspected, and then showed 11 per cent. of failures where the old vacancies had been filled up; whilst in the part where this had not been done, the failures amounted to 42 per cent.

"By the middle of October the want of rain and moisture, although the forest had been left standing on both sides of these lines, had begun to tell on the cuttings, and the failures in that portion of the plantation where the vacancies had been filled up were 54 per cent., whilst where this had not been done, on account of the season being so far advanced the failures amounted to 88 per cent.

"The last inspection, made on the 18th of February, showed the following results:—

Percentage of plants alive	5
„ failures	95

"This is the result of the first trial, which, under the circumstances above mentioned, could hardly have been otherwise.

140. "Immediately on receipt of the Government orders regarding rubber-plantations in June 1873, the necessary instructions for the palling of a number of rubber-trees was given to ensure a supply of vigorous young branches for this year's plantations and nurseries; and this was perfectly successful, inasmuch as by the end of the rains these trees were covered with numbers of fine young branches.

141. "The cost of this experiment has been:—

		Rs.	A	P.
1.	Collecting of branches	58	0	9
2.	Clearing lines	84	8	0
3.	Planting branches	29	0	3
	Total ...	171	9	0, or Rs. 9-5-11 per acre.

142. "These 18 acres of 1873 have been replanted, and 17 acres been added on lines 50 feet apart, measured from centre to centre of the lines. The branches were put out at distances of 25 feet, since the land available is either mixed plain or Savannah forest, rendering closer planting than in the lower hill forests advisable.

"In addition to this, nurseries measuring about 2,000 square feet were got ready for cuttings, and Mr. Aylmer reports that he has about 1,200 which are rooted and doing well.

"The expenditure on this year's extension and nursery up to the end of the financial year has been Rs. 206-4-0, which, together with the above amount of Rs. 171-9-0, makes the total expenditure on rubber-plantations in the Gowhatty sub-division Rs. 377-13.

143. "In the *Tezpore sub-division* rubber-plantations on a large scale were started in the Chardooar forest, about 18 miles north of Tezpore, during the cold season of the year under review.

"This locality was selected since the rubber-trees occur naturally in great numbers in this tract of country, reach higher perfection as regards size, and give greater quantities of rubber, than in most other districts of Assam.

"The original rubber-plantation reserve of 200 square miles had its southern boundary placed by the Deputy Commissioner of the district about seven miles away from all roads, villages, and cultivation of any description, in the midst of a very dense evergreen forest, where the difficulties of procuring labour would have been tenfold to what it was at the margin of the forest, and in the rains could not have been procured at all. Independently of this, it would have been extremely unhealthy, and the cost of establishing the plantation and nurseries very much greater, for which reason the district officer's sanction was obtained for commencing operations about one mile north of the northernmost village, and about half a mile inside the forest.

"Proposals for a small additional rubber-plantation reserve of about seven square miles, in accordance with the above permission verbally given, was submitted to the Deputy Commissioner of the district in the usual way.

144. "The soil in the locality where operations were started is alluvial, with deep vegetable mould on the surface; but this is considered of secondary importance, since the rubber-tree will grow on almost any soil, provided it has that combination of heat and excessive moisture of the atmosphere peculiar to the regions along the foot of the Himalayas.

"On this land operations were started on the right bank of the Mansiri river, and lines cut through the forest 20 feet in width—first at distances of 50 feet, and afterwards at distances of 100 feet from each other, on which branches were put out at distances of 50 feet.

"The extent of the area thus brought under cultivation up to the present is 180 acres. No clearing of the ground in the lines is attempted, since the plantation is situated in forests clear enough not to interfere with the young trees, and the surface of the soil is sufficiently open to all atmospheric influences, which benefit the young trees.

145. "A nursery was started on the same land, and beds four feet in width and raised about six inches above the surface constructed, with paths of two feet between the beds. The total area of the nursery prepared, planted, and shaded by grass from above and the sides is 17,700 square feet. Of this area 1,980 square feet were used for experiments with rubber-seed, and the remainder for cuttings, of which latter about 10,600 were made. The making of these cuttings before the end of January had been ordered; but the starting of the work in this locality being new, and Mr. Fisher new to the country, this most important time was lost before the cuttings were put in, and the percentage of losses has been accordingly great.

146. "We have much to learn yet; and as this is the first year, everything is to some extent experimental. We have, however, in spite of the difficulties upwards of 5,000 cuttings rooted and doing well, which will prevent any vacancies remaining after the end of the rains, and leave a large supply for next year's extensions.

147. "About three-fourths of these cuttings were raised under artificial shade, and one-fourth in the open, with shade towards the south from the trees only. The latter cuttings were larger, and the wood harder, and they have done almost as well as those more sheltered. All were watered when necessary.

"On the whole large cuttings of over two feet in length with the wood harder have done better than young soft cuttings, which has to be attributed chiefly to their having been made a month too late, when the spring growth had set in.

148. "To give the raising of rubber-plants from seed a fair trial, about 30 seers of seed, or rather fruit, were collected and sown in three different ways both at the Kulsi plantation, in the Gowhatty sub-division, and the Chardooar plantation, in the Tezpore sub-division. The different modes used were the following:—

"*First*—On beds covered with broken bricks, half of which was sown with entire fruit or figs, and the other half with the fruit broken up or rubbed into powder between the hands.

"*Secondly*—Sown like the above, but on broken charcoal.

"*Thirdly*—Sown like the above, but on earth only.

"The seed was sown in the middle of January and germinated in the middle of April. Germination took place best on the broken bricks, next best on the charcoal, and least on the earth. The seedlings on the charcoal stood the heavy rains best, those on the broken bricks next, whilst those on the soil nearly all perished. They require no shading, and grow all the stronger by exposure to the light and sun; but as a matter of course they will require a great deal more care and attention than cuttings, and for several years, whilst cuttings can be transplanted before they are a year old.

149. "The trees which were lopped last year and supplied this year's cuttings will supply a greater quantity next year, and other trees have been lopped this year in addition, to ensure an ample supply of young shoots for next year's propagation.

150. "The cost of these plantations per acre, it is estimated, will be about as follows:—

	Rs.	A.	P.	
Cutting of lines	1	2	0	
Cost of nursery and planting	0	2	0	
Cost of establishments	0	12	0	
Total ...	2	0	0	per acre.

"The total cost of the Chardooar rubber-plantation up to the end of the financial year has been Rs. 415-3-6."

TEAK IN BENGAL GENERALLY.

151. Regarding the teak-plantations in Chittagong, the Conservator hopes to give in next year's report his views in detail. The following general remarks refer to Bengal and Assam without Chittagong.

152. In last year's report, paragraphs 177 to 188, the Conservator has given his opinion on this subject, which he summed up in these words: "Teak of inferior and moderate quality can be produced in the Bengal plains, Behar, and Lower Assam, but there is no proof as yet to show that superior teak can be produced in the Sikkim terai or in Lower Assam; and in Upper Assam it appears doubtful whether it will thrive at all." The year 1873-74 has brought some new experience. In the first instance during the rains the larva of a borer made its appearance in the Kulsi plantation, in Assam, attacking about one-fifth of all seedlings. In the cold weather it disappeared, but the Conservator fears it will come again in the rains. The seedlings, it is true, have not died altogether, and sent out fresh and vigorous stump-shoots, but still the phenomenon is of a very serious description, and should be carefully watched.

153. Another point is the unfavourable germination of teak-seed in Bengal, especially in the Darjeeling terai. In 1873 all Indian teak-seed failed, and this year ten maunds of Burma seed sown at Bamunpokree under the Conservator's own supervision have produced only a small number of seedlings. This is a very serious consideration, which necessitates a change of programme. As out of the seedlings planted originally only a small percentage reaches maturity, it is not necessary to cover the ground entirely with teak. In 1874 the plantations at Bamunpokree have been laid out half with teak and half with toon. Next season we shall plant teak 15 feet apart either way, or only 194 seedlings per acre, and fill the area up with toon, so as to have finally a plantation in which the seedlings stand 5 feet apart each way. In this way a great saving in teak-seedlings will be effected. Toon, on the other hand, we found this year will spring up like grass, and it stands transplanting remarkably well. In this way it is hoped to reduce the expenditure, which has been extremely high hitherto, to a reasonable figure.

INDIA-RUBBER TREES IN BENGAL GENERALLY.

154. This subject has been freely discussed during the year. The Conservator of Forests arrived in Bengal in December 1872 only, and consequently when writing last year's report his experience of India-rubber was very small. Another year's experience, however, has made him more confident now in expressing a decided opinion on the subject.

155. The *fiscus elastica*, or Bengal and Assam India-rubber-tree, grows naturally as an epiphyte only. The natural trees are found in the warm and moist forests along the foot, and in the side valleys of the mountain-ranges in the north and east of Bengal up to an elevation of 2,000 feet. The seed is

deposited by birds on trees, where the seedling as a rule establishes itself in the upper forks or holes of the branches at a height of from 60 to 100 feet from the ground. It begins at once to send down aerial roots in great numbers, which gradually reach the ground and grow into respectable stems; so that one tree comprises sometimes up to forty and even more stems. All these stems communicate with only one head of branches and leaves, and the proportion of stems to branches and leaves is very great. Each stem supplies only a fraction of the crown with vegetating fluid, and consequently all surplus milk may be removed and manufactured into India-rubber.

156. On the other hand, if the tree has been reared in the ground, it consists of one stem only of from 10 to 15 feet height, with a large crown of branches and leaves. Aerial roots are indicated, which rarely reach the ground, but represent thin dry strings; consequently all the milk upon which the large mass of branches and leaves vegetate has to be supplied by the one stem, and if that is tapped the tree must either die or at least be reduced to a skeleton. Dr. Henderson, late Officiating Superintendent, Botanical Gardens, Calcutta, has evidently overlooked this important difference when proposing to Government that rubber-plantations should be started by planting cuttings into the ground; and he made the additional mistake of assuming that the *ficus elastica* would yield rubber freely in all parts of Bengal, whereas it does so only where growing really luxuriantly, as in the north and east of Bengal, in the warm and moist climate near the foot of the hills, especially the Himalayas. Mr. Mann, who had great opportunities for studying the growth of India-rubber in its natural home, does not believe that the tree will yield rubber freely away from the warm and excessively moist localities indicated above; but he does not think that rearing the trees in the ground will prevent their yielding large quantities of juice. Dr. King, Superintendent, Botanical Gardens, Calcutta, and the Conservator of Forests, on the other hand, do not believe in trees grown in the ground. Dr. King urges to introduce instead the Peru rubber-tree (*Hevea Braziliensis*), of which he has brought a few plants to India, and which have taken root in the Botanical Gardens at Calcutta, as this tree grows without aerial roots and yields the juice freely from all its parts. The Conservator of Forests is of opinion that, if the Peru rubber tree will grow and thrive luxuriantly in India, it should certainly be planted on a large scale; but he has been told by a botanical authority that this tree is not likely to do so further north than perhaps Penang. Should this turn out to be correct, Bengal would after all have to fall back upon the indigenous *ficus elastica*, or give up rubber-cultivation altogether. The Conservator's opinion is that *ficus elastica* should be grown in the most favourable localities, especially in Assam along the foot of the Himalayas, in a way similar to that followed by Nature. Either seed, or much better seedlings, should be deposited on large useless trees in the evergreen forests, and in a systematic way. The difficulty of doing this is not so great as is usually assumed. In all forest countries in India, there are always men to be found who will climb the tallest trees in a remarkably short time; and when the seedling has once been securely established on the tree, it requires no further looking after, whereas plantations on the ground have to be taken care of for a long time, and at considerable cost.

157. Although the Conservator has no doubt in his own mind about the correctness of the above views, still others do not share his opinions; and if *ficus elastica* is to be raised by means of cuttings or seedlings planted in the soil, the Conservator would strongly urge that they be planted not further apart than 15 feet, as proposed by Dr. Henderson, and not 100 by 50 feet, as proposed by Mr. Mann, because this kind of tree will not grow to half or quarter the size of an epiphytic tree. Moreover, he would strongly recommend that some of the largest trees artificially raised at Gowhatty be systematically tapped, to see how much rubber they will yield. Although they grow in less favourable localities than those selected for the Assam rubber-plantations, still they will enable us to form an approximate estimate of the rubber-yielding capacity of trees reared in the ground.

MAHOGANY IN BENGAL GENERALLY

158. During the year the question has been raised whether mahogany-seed should not be introduced on a large scale from the West Indies. Dr. King proposes to appoint a special seed-collector, and to raise the species of mahogany on a large scale. The tree grows doubtlessly well in the Bengal plains. At Titalia there are, however, some specimens which have not thriven very well hitherto, and the Conservator of Forests thought that the moister and cooler climate might afford an explanation. During the rains of 1873 some seedlings were planted at Bamunpokree, situated immediately at the foot of the Himalayas. These grew very little during the last year, but since the commencement of the rains of 1874 they have made a wonderful start; and the Conservator would not be surprised if the terai, wherever it is well drained, should prove to be a more favourable locality than the rest of Bengal. Certainly the unfavourable growth and the dying off at an early age of two mahogany-trees at Gowhatty, in Assam, warns us to be cautious in damp localities. Three years hence we shall be able to judge of the growth of the young trees at Bamunpokree.

PLANTATION RECORDS.

159. With last year's report the instructions issued regarding the preparation of plantation records were given. During the year those of Cooch Behar and Assam have been taken in hand. The record of the Bamunpokree plantation, parts I and II, has been given in appendix IX; those of the other plantations will be given in next year's report. Part III, which comprises the annual record as the work proceeds, need however only be recorded in the plantation file and the office of the Conservator of Forests.

SECTION V.—YIELD OF THE FORESTS.

COOCH BEHAR DIVISION.

160. In this division we are still occupied with clearing out old stock. Large quantities of timber were felled in former years, a few logs transported to depôts, and the remainder left in the forests where they were felled; however they were shown on the books as lying in so-called forest depôts. Thus it comes that we have a large quantity of logs in depôts on the books, whereas in reality the greater number are lying scattered over the forests, and all that has been done is that the trees have been felled. In some cases, as for instance in the Buxa forest, many of the logs have not even the branches cut off to the present day. On the other hand, these logs, although the expense incurred on them is in some instances not more than eight annas each, make a considerable show in the value of stock. And again, only a portion of them fetch the prices at which they are valued, whereas the greater portion has to be sold off considerably below the estimate. The consequence is that not only do the timber-works now conducted, as exhibited in the annexed statements, appear insignificant, as the logs brought out of the forests are all entered as lying in depôts, but the net revenue appears lower than the year's transactions entitle us to. This will continue to be the case until all old stock has been cleared off, which the Conservator hopes will be the case by the end of 1874-75.

161. On this subject Mr. Gamble reports as follows:—

"Great inconvenience is found by the multiplicity of small forest depôts on the divisional books, such as—

"*Buxa forest.*—Logs scattered all over the forest.

"*Sukna.*—Logs, sleepers, and scantlings lying anywhere in the forests between the Teesta and the Balasun, with the exception of Sivok; the chief points where occasionally a few logs have been collected together being Gulma,

Choklong, Mahanuddy, Hattisurra, Puncheenai, Sukna, and Chirungkhola, the vast majority of the timber being really scattered about the forests, often in very inaccessible spots.

"*Lohagurh.*—Logs lying anywhere in the country between the Balasun and the Mechi, with a few at Hattighisa, on the borders of the Dalka Jhar.

"*Lish and Ghish.*—A number of sleepers lying about, chiefly on Mongpong Hill and in the Lish River.

"*Reyang.*—Logs and sleepers lying all along the Teesta valley.

"*Muraghat.*—Logs lying scattered about the forest.

"It is almost impossible to verify the stock of timber: in many cases timber which appears in the books cannot be found, as for instance at Sivok. At that depôt, after a careful search, over 100 logs and about 300 sleepers borne on the books could not be found."

162. The pieces brought on the books of this division during the year are 112 toon planks and 8 khala kambas; but on reference to form No. 25 it will be observed that although 1,084 logs have been removed by purchasers from station depôts, the number of logs in them at the close of the year surpasses that at the beginning of the year by 204; so that in reality 1,288 logs have been brought from the forests to station depôts. Of these a number of sâl logs were floated from Sivoke to Julpigoree, and 1,176 sâl logs were dragged out of the Buxa forest to the Buxa road, and upwards of 500 carted to Alipore—operations which do not appear in the annual record.

163. Of the old stock at Rangbul depôt, near Darjeeling, 550 logs have been sold by public auction during the year; but the prices realized are very low, and at the last auction no offers at all could be obtained.

The rates realized were:—

				Rs.	A.	P.	
At a sale held in	May	1873	... ...	0	1	6	per cubic foot.
„ „ „	September	„	... ...	0	1	4	„ „
„ „ „	November	„	... ...	0	0	5	„ „
	Average		... ...	0	1	1	

The fact is that the timber is very inferior in quality, and Mr. Kenoy, of the Public Works Department, who has some ten years' experience in Darjeeling, informed the Conservator that timber seasoned in the log would not last in the Darjeeling Hills, it being consumed by dry rot within a very short time.

Under the circumstances, the remaining old logs will be sold for whatever they may fetch; and in future no hill timber will be kept in depôt. The financial loss on the logs amounts to Rs. 1-8-5 each.

164. A number of years ago this Department attempted to bring the timber of *pinus longifolia* into the market. A hundred logs were bought from the Rajah of Sikkim, brought to the banks of the Rangit river at a cost of Rs. 9 each, and left there to their fate. As a trial ten logs were put up for auction, which fetched one rupee each, or at the rate of Rs. 0-0-4 per cubic foot. Attempts will be made to sell the remaining logs for whatever they may fetch.

165. A clearance auction-sale was held at Julpigoree in August 1873. The amount realized was at the following rates.

	In No.	Cubic feet.	Amount Rs	A.	P.		Rs	A	P.	
Sâl logs ...	87	2,282	1,593	0	0	or	0	11	2	per cubic foot.
Pine logs ...	7	162	10	0	0	„	0	0	1	„ „ „
Unknown ..	1	24	3	8	0					
Khalakambas	19	0	12	0	0					
Sâl planks ...	86	0	53	0	0					

166. The annual sale at *Alipore* was held on the 20th March 1874, when 300 sâl logs were sold, which realized :—

	Logs.	Cubic feet.	Amount Rs. A. P.	Per Cubic foot. Rs. A P.
1st class	220	5,978	4,290 0 0	0 11 5
2nd class	80	1,504	704 0 0	0 7 5
Total ...	300	7,482	4,994 0 0	0 10 8

The expenses in bringing this timber to depôt were the following :—

	Rs. A. P.
Felling and barking per log	0 8 0
Dragging (including keep and feed and ten per cent. of value of elephants)	2 0 0
Total ...	2 8 0

	Rs. A. P.	
Or at the rate of	0 1 7	per cubic foot.
Carting	0 3 6	„ „ „
General expenses	0 0 10	„ „ „
Total ...	0 5 11	

The net surplus amounts, therefore to Rs. 0-4-9 per cubic foot. The net profit at last year's sale amounted to Rs. 0-3-3 per cubic foot, so that this year shows an increase of 46 per cent. against last year, although the price of the timber was eight pies per cubic foot higher last year. The cost of extracting this year's timber was Rs. 0-5-11 per cubic foot, against Rs. 0-8-1 last year, or a saving of 27 per cent. This is owing to the employment of elephants, instead of coolies for dragging

167. During the year 1874-75 the timber operations in the Cooch Behar Division will be of a different stamp to that of the last few years. The Northern Bengal State Railway is now under construction, and sleepers have to be prepared and logs provided for it. Moreover the surveys of the last season have shown that the Buxa forest is capable of yielding permanently 5,000 sâl-trees per year, and arrangements are being made to work it up to 3,000 trees per year for the present. For this purpose two elephants are available and four more are required.

168. The material removed by private parties from the forests of this division during the year is enumerated in the subjoined list.

Name of Trees.	Number of trees or pieces sold.	Amount realized.	Average amount per piece.	Remarks
Darjeeling Sub-division.		Rs. A. P.	Rs. A. P.	
Sal { Green	475	4,750 0 0	10 0 0	
Sal { Dry	1	20 0 0	20 0 0	
Sal { Khala kambas	.....	..		
Sissu { Green	3	30 0 0	10 0 0	
Sissu { Dry	5	21 0 0	4 3 2	
Toon { Green	50	615 0 0	12 4 10	
Toon { Dry	4	36 0 0	9 0 0	
Saj	33	330 0 0	10 0 0	
Cheloni	38	388 0 0	10 4 2	
Champ { Green	98	1,176 0 0	12 0 0	
Champ { Dry	6	56 0 0	9 5 4	
Bux { Green	60	720 0 0	12 0 0	
Bux { Dry	2	16 0 0	8 0 0	
Katoos { Green	31	372 0 0	12 0 0	
Katoos { Dry	1	10 0 0	10 0 0	
Pipli	2	18 0 0	9 0 0	
Lali	3	24 0 0	8 0 0	
Aurote	1	20 0 0	20 0 0	
Goguldhup	3	18 0 0	6 0 0	
Pantsaj	2	16 0 0	8 0 0	
Budgrat	1	12 0 0	12 0 0	
Puddum (dry)	1	4 0 0	4 0 0	
Miscellaneous trees	10	60 0 0	6 0 0	
Fire-wood	614 tickets	614 0 0	1 0 0	
Charcoal	10 „	20 0 0	2 0 0	

Names of Trees.	Number of trees or pieces sold.	Amount realized.	Average amount per piece.	Remarks.
Julpigoree Sub-division.		Rs. A. P.	Rs. A. P.	
Sal ... Green	1,045	7,387 0 0	7, 3, & 10 0 0	
Sal ... Dry	667	683 0 0	1 0 4	
Sal ... Khala kambas	1,379	802 0 0	0 9 3	
Sissu ... Green	3	21 0 0	7 0 0	
Toon ... Green	.....	.....	.....	
Toon ... Dry	2	24 0 0	12 0 0	
Cheloni ... Dry	2	9 0 0	4 8 0	
Boeri	2	12 0 0	6 0 0	
Total ...	.....	18,284 0 0		
Deduct— Amount due but not realized during the year	.....	62 8 0		
Balance ...	.....	18,221 8 0		
Add— Amount realized on account of former year	.....	240 0 0		
Total shown as revenue on account of timber sale	.....*	18,461 8 0		

This statement shows a considerable increase against last year. It appears that most people in this division were formerly under the impression that timber was not to be obtained from the Government forests by private parties. This misunderstanding has now been thoroughly cleared up, and there is no doubt that twice and three times as much timber would find ready purchasers if the Darjeeling sâl-forests could stand so large an increase of yield. The latter is now so fixed as to allow of a gradual improvement of those forests, which have formerly been over-worked.

169. *India-rubber.*—The collection was done by the Department through the mandals of the villages in the Teesta valley and adjoining lower hills. The trees have not been over-tapped, and the quantity collected amounts to 173 maunds. Of this quantity 73 maunds came from Dumsong sub-district, and 100 maunds from the Darjeeling sub-district. The rates paid are Rs. 20 per maund of first class rubber, and Rs. 10 for second class rubber. The total receipts were Rs. 10,669-15-0, or Rs. 64-4-0 per maund sold, 7 maunds having dried while in transit; the total expenditure Rs. 4,027-5-11, leaving a surplus of Rs. 6,642-9-1.

170. Of other articles of minor forest produce, the collection of taj, munjista, hurdi, and rita, brought in Rs. 235; canes Rs. 132, bamboos Rs. 238-8-0. Taj is *cinnamonum albiflorum*, a pretty large tree found up to 4,000 feet elevation. The bark is exported, and the leaves are sold in the bazars for curries.

Munjista is *rubia cordifolia*, a small climbing plant, common from 4,000 to 8,000 feet. Its stems are dried and exported. The plant yields a dye, which varies in colour from yellow to red and reddish brown. Hurdi is *morinda lanceolata*, a shrub common in the terai and lower hills. Its root yields a yellow dye. Rita is *sapindus sp.*, the soap-nut. The fruit is used for washing, epecially for the hair.

CHITTAGONG DIVISION.

171. The Commissioner reports as follows:—"Regarding the quantities of material removed from the forests, the Assistant Conservator writes as follows:—"I have again to report an increased outturn of timber from the Government forests, the yield for the year under review being 2,759 tons, against 2,164 tons in 1872-73 and 1,518 tons in 1871-72. It is with regret that I observe the principal increase is in timber converted into dug-outs, which has increased steadily and perceptibly from 244 tons in 1871-72 to 1,087 tons in 1872-73, and again to 1,640 tons in 1873-74. The largest supply of timber in logs was derived in 1872-73, when 1,056 tons were brought out against 433 tons during

the previous year, and 610 tons in the subsequent or year under report. Converted timber brought out in 1871-72 was 841 tons, against 19 tons in 1872-73, and 509 tons in 1873-74.

"The reason for my regretting the increase in quantity of timber used for boats is that I consider the practice of scooping out trees and making them into dug-outs causes a greater waste of timber than can be justified. In my peregrinations through the forests, I have frequently come across partially scooped logs, which on examination I have found to be abandoned on account of decay or heart-shake. A tree outwardly appearing sound is felled, and the digging out continues until the flaw in the wood is discovered, when it is at once set aside and allowed to rot, and another is cut down and perhaps is treated in the same manner as the first. Besides this, the waste of wood in making this description of boat is very great, and the quantity of timber employed in one such boat would, I believe, be sufficient to construct ten or a dozen planked boats. In my opinion it would be worth while for Government to introduce and encourage the manufacture of built boats at any cost."

172. "As regards this subject, the Deputy Commissioner has made the following remarks:—

"Before condemning such boats altogether, it would be well to ascertain what the relative cost of a planked and of a dug-out boat would be, how much longer the one would last than the other. If boat building is likely to succeed, and I see no reason why it should not, let it be introduced by all means, and the trade in dug-outs will gradually be ousted. If introduced, I would suggest taking advantage of the Government grant for an artizan school. The trade taught at present (goldsmith's) is not attractive to hill-people; perhaps boat-building might prove more successful."

173. "I have asked the Deputy Commissioner to ascertain whether boat-building would be a popular industry among the hill-men, and whether he can obtain the services of an instructor in this art for the artizan school. The best plan for discouraging the manufacture of dug-outs and checking the consequent waste of timber, which has been overlooked by the Deputy Commissioner in his remarks, will be, I think, to levy a heavier rate of tolls on all such boats when brought past the toll-stations. The question will be taken up and considered.

174. "The Assistant Conservator states that the principal supplies of logs are derived from the Kassalong, Chingri, Subalong, and Renkheong streams; that boats are brought from the Kassalong, Chingri, Subalong, Renkheong, and Kaptai streams; and that sawn timber is procured from the Myunni and Chingri valleys.

175. "The subjoined statement gives the quantities of forest produce brought down during each of the last three years:—

Description of Materials.	Year.		
	1871-72. Tons.	1872-73. Tons.	1873-74. Tons.
Timber in logs	433	1,056	610
„ „ boats	244	1,089	1,640
Beams and planks	841	19	509
Total	1,518	2,164	2,759

ASSAM DIVISION.

GOWHATTY SUB-DIVISION.

176. Sixty-one sâl logs, left in the Rani open forest by a contractor, who failed the year before, were worked out and brought to Gowhatty. They measured 1,105 cubic feet, and were sold at the rate of Re. 0-9-9 per cubic foot. The expenditure was Re. 0-2-11 per cubic foot, leaving a surplus of Re. 0-6-10 per cubic foot.

177. In the Pantan reserve 201 sâl-trees were felled, worked out to Korkumara depôt by dragging and floating, and sold to the Public Works Department at the rate of Re. 0-13-3 per cubic foot. They measured 4,611 cubic feet, and the expenditure incurred amounts to—

		Rs.	A.	P.	
Felling and floating	... ...	0	1	0	per cubic foot.
Dragging, estimated	... ...	0	2	6	„ „ „
Total	...	0	3	6	„ „ „
Leaving a surplus of	... ...	0	9	9	„ „ „

In addition to the above, 112 sâl-trees were felled, six of them sold at the forest depôt, 58 used in the construction of the bungalow at Kulsi, for the use of the sub-divisional officer, and 48 remain in a temporary depôt on the Kulsi. A further number of 456 sâl-trees were sold from the Kamroop reserves partly to the Public Works Department and partly to private parties at the rate of Rs. 8 each. A number of smaller pieces were disposed of for the aggregate amount of Rs. 143-2.

GOLAGHAT SUB-DIVISION.

178. In the Nambor reserve 450 trees of ajhar and nahor were felled for the Public Works Department; of these 122 logs were brought into the Golaghat depôt, 293 to the banks of the Dhunsiri, and 35 remain in the forest. None of the timber has been made over during the year.

179. Of ajhar sixty-three trees and of nahor two were sold standing in the forest for Rs. 6 each to the Public Works Department.

TEZPORE SUB-DIVISION.

180. From the Balipara reserve 129 dry sâl logs were brought to the banks of the Mansiri and Baroli rivers, and 132 logs and pieces were collected at a temporary depôt on the edge of the forest. One hundred dead sâl-trees were sold in the forest to the Tezpore road-committee at the following rates now in force in Assam for dry sâl timber:—

Size of Piece.		Rates per Piece.		
Middle girth.	Length.	Sâl.		All other reserved trees
		Rs.	A.	Rs. A
Under 2′	Any	0	8	0 6
2 to 3′	Any	1	0	0 12
3 to 4′ 6″	Under 15′	2	0	1 8
3 to 4′ 6″	Above 15′	3	0	2 4

181. The yield of the open forests in Assam cannot be given, their management being under the district officers.

182. The question how to deal with the India-rubber in Assam has been freely discussed during the year, but no final decision has been arrived at.

SECTION VI.—FINANCIAL.

183. The regular budget estimates for the year 1873-74 were—

	Rs.
Receipts	1,47,400
Expenditure	1,33,888
Surplus	13,512

The actuals of the year are—

	Rs.
Receipts	1,79,366
Expenditure	1,37,498
Surplus	41,868

The net results of the year's work amounts to Rs. 47,937, as exhibited in (revised) form No. 28.

184. As compared with last year's results, the figures stand as follows:—

	Rs.
Receipts in 1872-73	1,49,852
Ditto in 1873-74	1,79,366
Increase in 1873-74	29,514
Expenditure in 1872-73	99,617
Ditto in 1873-74	1,37,498
Increase in 1873-74	37,881
Surplus in 1872-73	50,235
Ditto in 1873-74	41,868
Decrease in 1873-74	8,367
Net results of work in 1872-73	39,986
Ditto ditto in 1873-74	47,937
Increase in 1873-74	7,951

It will be seen that the receipts increased by Rs. 29,514, the expenditure by Rs. 37,881, causing a falling off in the cash surplus of Rs. 8,367; but at the same time the net value of the year's transaction has increased by Rs. 7,951, so that the results stand more favourable than those of last year.

185. The increase of receipts is chiefly under I and II, sale of timber and fire-wood, in the Cooch Behar and Assam Divisions, and under IV, permit fees, &c., in the Chittagong and Dacca Divisions.

186. The large increase in the expenditure is—

	Rs.
Under A.I., timber expenses	5,598
„ A.V., collection of India-rubber ...	4,438
„ A.VI., plantations	9,453
„ A.VII., forest work	2,092
„ B.I., salaries	14,683
„ B.II., travelling allowances	4,208

The increased expenditure under A.I. and V. has been partly repaid to the Department under the corresponding receipt heads, and partly will be in 1873-74. Against the expenditure under A.VI. we have to show an increase of plantation area amounting to 301·5 acres. The benefit derived by the increase under A.VII. cannot be shown in figures. The increase under B I. and II. has been brought about by a considerable increase of superior and subordinate establishment; and that this expenditure has been spent well, the Conservator trusts will be seen from this and last year's report. The receipts alone have risen from Rs. 1,39,089 to Rs. 1,79,366 during the last two years, and the net profit of the year's work from Rs. 31,429 to Rs. 47,937. Moreover it should be noted that the increase in receipts has been effected by the officers of the Department, whereas the collections by civil officers have fallen from Rs. 60,529 in 1871-72 to Rs. 55,117 in 1873-74.

187. The following table shows the financial results of the several divisions. In it the expenditure of direction has been distributed equally, and that of the Office of Forest Accounts according to the expenditure in the several divisions:—

Names of Divisions.	Receipts.	Expenditure.	Surplus.	Deficit
	Rs	Rs	Rs.	Rs
Cooch Behar	51,084	56,147	...	4,463
Bhagulpore	7	4,064	...	4,057
Sunderbuns		7,082		7,082
Chittagong	72,042	16,236	55,806	
Assam	37,889	51,003		13,114
Dacca	17,744	2,966	14,778	
Total	1,79,366	1,37,498	41,868	

It will be observed that only Chittagong and Dacca show a surplus, that is the divisions in which no conservancy measures have been adopted. Assam has worked with a deficit for some years past, owing to the non-settlement of the India-rubber question, and the charging of a good sum of forest revenue under land revenue, whereas the Department has all the expenditure of forest conservancy to bear.

In Bhagulpore and the Sunderbuns we have only been exploring as yet. In the former the Palamow forests will be taken under management at once, so that the year 1873-74 will show some receipts. The question how to deal with the Sunderbuns is still pending.

188. The deficit in the Cooch Behar Division is not only of a temporary nature, but it may also be called an artificial one. In the first instance the accounts of a former contractor, Mr. Kruger, have been adjusted during the year, showing a sum of Rs. 7,074 against the year under expenditure; secondly, an officer and establishment have been entertained for the examination of the Eastern Dooars sub-division, which however yielded no revenue at all. But thirdly and chiefly, owing to the commencement of the Northern Bengal State Railway, the Government of Bengal prevented the Conservator from satisfying numerous applications from private parties for timber. There is not the slightest doubt that the falling off during the year 1873-74 will be more than made up for in 1874-75. Sleepers and beams are already under preparation for the railway, and the Buxa forests will be worked up to 3,000 sâl-trees per year at once, and up to 5,000 trees gradually. The Conservator expects that Cooch Behar will henceforth yield a net revenue equal to that of Chittagong—but with this difference, that the Cooch Behar forests will be worked so as to increase gradually in yielding capacity, whereas it appears more than probable that the Chittagong forests are being worked out gradually.

189. The outstandings of the Department have been decreased during the year from Rs. 17,924 to Rs. 8,842. A further reduction will be attempted in 1874-75.

190. The Conservator considers it necessary to refer here to certain remarks made by the Officiating Inspector-General of Forests in his annual report for 1872-73, paragraphs 199 to 203, regarding form No. 28, exhibiting the value of the year's work. The object of form 28 is to exhibit the *merits* of the year's transactions: that is to say, to show how far the administration has been financially successful during the year, irrespective of obligations entered into in former years or for the benefit of future years. It appears to the Conservator that the so-called "revised form No. 28," which was introduced last year, secures the object in view; whereas the presumably more correct form given by the Officiating Inspector-General in his paragraph 203 fails to do so, because it does not take into consideration adjustments made during the year of obligations entered into in former years. And as an instance the Conservator will mention here the adjustment of Mr. Kruger's accounts, a contractor who failed in former years.

The Officiating Inspector-General's objections recorded in his paragraph 200 will be removed simply by calling for the details necessary to check

form 28. Mistakes in calculation, as cited in the case of the North-Western Provinces, can hardly be brought up against the usefulness of the form itself.

As the Officiating Inspector-General's form is not likely to be permanently adopted by Government, and as no decided orders have been received on the subject, the Conservator has prepared form 28 in the same manner as last year.

191. In conclusion, the remarks made by the Commissioner of Chittagong under this section are appended:—

"Under the heading of *receipts and disbursements*, the Assistant Conservator makes the following remarks:—'The financial results show a surplus of Rs. 55,186-8-4, as will be seen from the following:—

		Rs.	A.	P.
Receipts	..	70,648	6	6
Deduct collections on account of previous years ..	..	4,821	2	0
	Total ..	65,827	4	6
Add outstandings on account of the year ..	..	2,045	3	0
	Total ..	67,872	7	6
Expenditure during the year ..	.. ..	12,685	15	2
	Surplus ..	55,186	8	4

192. "'The revenue of the year shows an increase of Rs. 12,247-10-0, being the difference between Rs. 67,872-7-6 collected this year and Rs. 55,624-13 realized last year. This is partly attributable to the revival of permit-fees and opening of new toll-stations.

193. "'The expenditure during the year likewise shows an increase of Rs. 2,490-13-2. This has arisen almost entirely from additional establishment and payment of commission to toll-collectors appointed on the newly established toll-stations.

194. "'At the end of last year there was an outstanding balance of Rs. 4,821-2-0 on account of that year, which was paid into the Treasury during the year under report. At the end of the year 1873-74, Rs. 2,045-3-0 were in course of transit to the Treasury; and as it was not paid in before its close, it appears as an outstanding item.'

195. "'The Deputy Commissioner makes the following comments on the financial results:—'The financial results of the year are highly satisfactory. Some propositions are about to be submitted regarding the abolition of forest produce and grass-land leases, which bring in an annual revenue utterly insignificant in comparison with the profits made by the lessees. The gist of the proposal is to throw the whole Hill Tracts open to wood and grass-cutters as far as the payment of rental on lands for the privilege of removing forest produce and grass from them is concerned, and to increase the tolls payable on the produce exported in a ratio which will bear some comparison with the sums paid hitherto to the lessees. It is expected that by carrying this proposition into effect a large increase in the collections will result.' I await the receipt of the report promised by the Deputy Commissioner.

196. "The tolls on all rivers in the Hill Tracts except the Fenny are collected by the Forest Department. The collection of the tolls on the Fenny has been made over to the Department since the close of the year. It was formerly in charge of the Hill Chief, Mong Rajah, under the Deputy Commissioner, and all tolls collected on produce coming from the right bank were paid to the Rajah of Hill Tipperah. An agreement has, however, been recently come to with the sanction of Government, according to which five-eighths of the tolls are to be paid to the Rajah of Hill Tipperah and three-eighths credited to Government, the management remaining with the Forest Department, and an official on behalf of the Rajah being present and checking the accounts. The Rajah has also agreed to the rates of tolls on the Fenny being equalized with those on the other rivers in the Chittagong district.

196. "The most important toll-stations which were under the Forest Department during the year are the Kurnafoolee, the Sungu, and the Matamoree toll-stations. On the first-mentioned river Rs. 47,499-15-9 were realized, against Rs. 39,706-1-0 of the preceding year; Rs. 7,854-11-9 were realized on the second river, against Rs. 7,615-1-6 of the preceding year; and Rs. 3,638-10-3 on the third river, against Rs. 3,678-13-9 of the previous year.

197. "The present Deputy Commissioner has suggested that gurjun-oil, of which 2,905 maunds came down the Matamoree alone during 1873-74, should not be left untaxed. His predecessor was, however, I find, of a different opinion, and did not support the Assistant Conservator's proposal for including krug and patti-leaves and gurjun-oil in the list of taxable articles, on the ground that the system at present prevailing of granting leases of the forest products of specified tracts of land already realizes, or should realize, the Government dues on the articles in question. The consideration of this subject may well be postponed, I think, till the receipt of the Deputy Commissioner's report above referred to."

SECTION VII.—GENERAL.

ELEPHANTS.

198. The Department owns at present the following elephants—

Cooch Behar Division	...	...	...	5
Assam ..	...	...	...	7
		Total	...	12

The number provided for Assam is sufficient for the present. Of those in Cooch Behar, two are required for travelling and one for timber works in the Darjeeling sub-division. This leaves two for the Buxa forests, for which six are required to drag out the annual outturn of 3,000 trees. Two elephants have been applied for to be purchased at once, and the funds for two more will be provided for in the budget of 1875-76. The Chittagong Division should also be supplied with two elephants, if conservancy measures are to be adopted in the Hill Tracts.

THE LIST OF TREES FOUND IN THE DARJEELING DISTRICT.

199. Under preparation by Mr. Gamble, has been considerably advanced during the year, but it will not be ready for publication until next year.

CONSERVATOR'S TOURS.

200. The Conservator spent three months, April to July 1873, in Assam, as mentioned in last year's report. Early in September he left Calcutta for the Cooch Behar Division, looking after the plantation work and examining some of the forests near Darjeeling. On the 23rd of October he left Darjeeling with Mr. Metcalfe, Commissioner of Cooch Behar, proceeded to the Rangit and Teesta valleys; to Dumsong; through that sub-division to the Western Dooars; to Julpigoree; thence to Cooch Behar, the Buxa forests, to the Eastern Dooars, inspecting with Mr. Shakespear the sâl-forests of that sub-division, and to Goalpara. From the latter place he proceeded to the outer Garo Hills; examined the forests in the Manda range, returned to Goalpara, and thence to Calcutta, which he reached on the 24th December. During the month of January the Conservator attended the first general forest conference at Allahabad, and he started again on the 25th of February for the Cooch Behar Division, where plantation operations and sleeper-works for the Northern Bengal State Railway necessitated his presence.

PROGRAMME OF WORK FOR 1874-75.

COOCH BEHAR DIVISION.

201. *Darjeeling Sub-Division.*—The examination of the reserved forests is to be proceeded with.

In Dumsong the boundaries of the future reserves will be determined on in conjunction with the Deputy Commissioner of the district.

The reserves already examined will be demarcated with masonry pillars at all important points, and the intermediate wooden posts renewed where necessary.

Cattle-grazing is to be excluded from the terai sâl-foests between the Mahanuddy and Teesta rivers.

Cultivation within the reserves should whenever possible be stopped, and when this is impracticable, transferred to the edge of the forest; the cultivated area to be taken out of forest limits and made over to the Deputy Commissioner of the district with the sanction of Government.

The creepers in the sâl-forests between the Mahanuddy and Teesta should be cut.

The timber operations depend upon the requirements of the Northern Bengal State Railway. The old sleepers on hand will be made over, about 25,000 narrow gauge sâl-sleepers, and about the same quantity of saj-sleepers, if approved of by the Railway authorities, will be cut. Large timber according to requirements and within the normal yield will be worked out. Temperate trees from the upper hill forests will be sold according to requirements.

India-rubber will be collected as usual, but the trees in the Sivok Hill Tract will be strictly protected against tapping for two years.

Plantation operations will be conducted at Bamunpokree and Rangbul according to the general plan of operations. Experiments with India-rubber seed will be made.

202. *Julpigoree Sub-division.*—The work of selecting reserves will be proceeded with first in the Buxa Hill forests, and then in the Borojar Satalia forest.

The Muraghat reserves will be demarcated by masonry pillars at all important points, and the intermediate wooden posts replaced wherever necessary.

The creepers in the Muraghat sâl reserves will be cut, and the reserve protected against fire and cattle. The Dainah sissu-forest will also be protected against fire and cattle.

In the proposed Buxa reserve, if sanctioned, a net-work of roads, running from east to west, and two miles apart from north to south, will be commenced; the beginning to be made on the Buxa road at the 19th-mile post in the southern part of the forest, from that post towards the east to the eastern edge of the Panbari sâl block, to be continued from the 21st-mile post towards the east. During the year 10 miles of road 15 feet broad should be laid out.

No cuttings will be made except in the Buxa forest, where 3,000 old sâl-trees upwards of six feet in girth will be cut and barked. The seasoned timber now lying in the forest will be dragged to the Buxa road, carted to Alipore, and sold, either by private sale or public auction. The 3,000 trees newly cut will be collected in batches along the new roads to be cleared, and next year carted to Alipore.

The old seasoned timber remaining in the Muraghat sâl-forest should be worked out and sold.

The reproductive measures during the year will be confined to protecting the Muraghat sâl and Dainah sissu-forests against fire and cattle. Hereafter the Buxa forest will be taken in hand.

203. *Palamow.*—A senior officer will be deputed to Palamow to organize the administration of the forests, and to select the areas to be declared Government reserves, in conjunction with the civil authorities.

204. *Sunderbuns.*—Enquiries are being made regarding the feasibility of using sundri timber for railway sleepers.

205. *Chittagong.*—The Commissioner writes as follows:—

"It appears that no administrative changes were introduced during the year. For the reasons already stated in the previous year's report, it has been deemed advisable to adhere to the simple system hitherto followed of realizing a fair return from the existing forests by collection of tolls on the numerous rivers which connect the forests with the markets, and of replacing the present cuttings by planting artificial forests to meet the requirements of future years.

206. "It is beyond question, I think, that the system of forestry in force in other parts of the country is not suitable to the Hill Tracts of this division. The system in force in this division has been gradually developed and extended during the year, and I do not consider that the introduction of any new measures for the conservancy of the forests is called for, since, owing to the checks established at the toll-stations, and the policy followed of inducing the joomeahs to take to plough-cultivation, all the action which is at present advisable has been already taken for controlling the amount and size of the timber cut, and for obviating the wholesale burning and destruction of the jungle."

207. And again he writes:—

"It will be seen from a reference to the previous year's report that collectors were appointed on commission to collect tolls on some minor streams. This system was introduced by the Assistant Conservator by way of experiment with the approval of my predecessor, Mr. Hankey, subject to a report on the working of the arrangements at the end of a year. This report has now been received from the Assistant Conservator, and is under consideration. As the commission system has not been found to work well, the toll-stations will be brought under direct management, or will be farmed out.

208. "As regards the trade in India-rubber, the Assistant Conservator states that during the year a trade in India-rubber has sprung up and promises in time to become a large business. The rubber is brought entirely, he continues, from the country beyond Demagiri by the Kookies. It is a matter for consideration whether the article should not be included in the list of forest produce and be made subject to a very light toll at the outset of (say) one rupee per maund. The price at which it is sold is, I believe, about Rs. 45 paid."

The Deputy Commissioner's remarks on this subject are quoted below:—

"The trade in India-rubber has certainly expanded greatly during the past year, but it is not one susceptible of indefinite increase. The Lushais tap the trees till they are thoroughly exhausted, and I hear that the country which used to supply Bepari Bazar, on the Dullessurri, yields little or nothing now. The trade further is so valuable to Government in a political point of view, that I doubt the expediency of taking any measures whatever which would be likely to impede it. India-rubber is an article of forest produce certainly, but the traffic therein which passes through the district has not the remotest connection with the Forest Department; and the question if further considered should be dealt with as one of general administration."

209. "I concur with the Deputy Commissioner in thinking that it would be impolitic to place any check, however slight, on the trade which is now opening out between the wild tribes to the eastward and the Chittagong Hill Tracts and the regulation district of Chittagong, and that as the rubber is not the produce of our own forests, it should be permitted to be brought down the rivers without any tolls."

210. With the sanction of Government the Conservator of Forests, Bengal, will examine some of the Chittagong Hill Forests during the ensuing cold season, so as to be able to advise Government regarding their management.

211. As Assam has been formed into a separate administration, nothing need be said here regarding the further work in that division.

SERVICES OF OFFICERS.

212. The Conservator has every reason to be satisfied with the manner in which the officers of the department have worked during the year.

Mr. A. L. Home, after having been in charge of the office of Forest Accounts from April to December, was occupied in December and January with the examination of the Eastern Sunderbuns. During February and March he was on special duty at the Andaman Islands. He has worked, as usual, in a satisfactory manner.

Captain C. W. Losack was in charge of the Cooch Behar Division until January 1874, when he was transferred to the office of Forest Accounts. He has since been transferred to the Central Provinces.

Of Mr. H. H. Davis the Commissioner of Chittagong writes as follows:—

"The Deputy Commissioner states that as far as he has had opportunities of judging, he considers that Mr. Davis's management is 'both able and energetic.' My predecessor has left no remarks regarding the manner in which Mr. Davis has performed his duties for incorporation in this report."

Mr. J. Sykes Gamble was in charge of the Darjeeling sub-division from the beginning of the year until January 1874, when he assumed charge of the Cooch Behar Division from Captain Losack. Although not successful in plantation work, owing to adverse circumstances and the novelty of the work to him, he has throughout the year taken great interest in the work, and done very good service.

Mr. W. Shakespear returned from leave in November 1873, and during the cold season he examined the sâl-forests in the Eastern Dooars and a portion of the Garo Hills forests. He has worked satisfactorily. He had again to proceed on sick leave immediately after the close of the year.

Mr. W. Johnston was occupied during the whole cold season with the survey, valuation, and mapping of the Buxa forest, a work which he conducted to the entire satisfaction of the Conservator.

Mr. E. Fuchs, a trained officer, who joined the Department early in January, has been posted to the Cooch Behar Division, to make himself acquainted with the work.

The Chief Commissioner of Assam, in forwarding the divisional forest report, has expressed no opinion regarding the work done during the year. The Conservator of Forests, however, has much pleasure in recording that Mr. G. Mann has been most zealous throughout the year, and the division under his charge has to show a large amount of work done during the year. Mr. Mann reports very favourably on the work done by his assistants, Messrs. A. P. Aylmer, W. R. Fisher, and H. B. Condon. The Conservator of Forests gladly endorses the good opinion expressed regarding Messrs. Aylmer and Fisher. Of Mr. Condon's work, however, he knows nothing, as that officer joined the Assam Division after the latter had been separated from Bengal. Mr. E. Forrest was transferred during the year to the Punjab in exchange of Mr. Condon.

Messrs. Mann, Aylmer, Gamble, and Fisher, passed the prescribed examination in Hindustani during the year; Messrs. Johnston and Fuchs have still to pass.

Messrs. Aylmer, Gamble, and Shakespear, were declared competent to hold charge of a forest division or range.

Before concluding, the Conservator has to offer his best thanks to Mr. S. Kurz, Curator, Botanical Gardens, Calcutta, for the kind assistance rendered in determining numerous species of trees from different parts of the country.

Form No. 21.

FOREST DEPARTMENT, BENGAL.

Annual summary of Revenue in the several Divisions during 1873-74.

Budget Headings.	Cooch Behar division.	Bhagulpore division.	Chittagong division.	Total of Bengal.	Assam division.	Dacca division.	Total of Assam.	Grand Total.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
I.—Sale of timber brought to depôt by Government agency ..	13,434 6 9	.....	.....	13,434 6 9	4,085 15 2	.....	4,085 15 2	18,120 5 11
II.—Sale of firewood and charcoal removed by purchasers ...	18,461 8 0	... .	.....	18,461 8 0	3,646 2 0	.....	3,646 2 0	22,107 10 0
III.—Duty on foreign timber	.. ..	.....	.....	.. ..	.....	.. ..	.....	. .
IV.—Permit fees, rent from squatters, &c.* .	10,145 5 8	6 0 0	71,892 5 6	82,043 11 2	27,405 10 10	17,744 8 0	45,150 2 10	1,27,193 14 0
V.—Grazing dues and fisheries	832 8 0	.....	.....	832 8 0	... .	.. . ..	.....	832 8 0
VI.—Sale of fruits, babool pods, India-rubber, &c.	8,476 9 8	.....	... .	8,476 9 8	2 2 0	.....	2 2 0	8,478 11 8
VII.—Sale of confiscated and waif timber ...	.....	.. ..	.....	..	....	..... .	....	
VIII.—Fines and forfeitures ..	157 4 3		15 0 0	172 4 3	.. ..		..... .	172 4 3
IX.—Miscellaneous receipts .	176 0 0	6 12 0	134 2 6	310 14 6	2,150 0 0	.. ....	2,150 0 0	2,460 14 6
Total	51,683 10 4	6 12 0	72,041 8 0	1,23,731 14 4	37,889 14 0	17,744 8 0	55,634 6 0	1,79,366 4 4

* Includes collections by civil officers.

Form No. 21.

FOREST DEPARTMENT, BENGAL.

Annual summary of Expenditure in the several Divisions during 1873-74.

Budget Headings.	Direction.	Cooch Behar division.	Bhagulpore division.	Sunderbun Examination Works.	Chittagong division	Total of Bengal.	Assam division.	Dacca division.	Total of Assam.	Grand Total.
A.—Conservancy and Working.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
I.—Timber expenses	.....	9,700 9 3	.....	.....	.....	9,700 9 3	2,061 8 4	.....	2,061 8 4	11,762 1 7
II.—Purchase of cattle and stock	.....	1,064 15 9	.....	5 8 0	32 11 6	1,103 3 3	6,317 1 9	.....	6,317 1 9	7,420 5 0
III.—Feed and keep of cattle	.....	2,722 14 5	29 0 6	.....	.....	2,751 14 11	2,501 8 9	.....	2,501 8 9	5,253 7 8
IV.—Rent of leased forests	.....	.....	.....	.....	.....	.....	833 5 4	.....	833 5 4	833 5 4
V.—Charges for collecting revenue on grass, &c.	.....	4,482 8 10	.....	.....	523 11 3	5,006 4 1	1 8 0	.....	1 8 0	5,007 12 1
VI.—Plantations	.....	6,345 14 6	.....	.....	1,945 14 4	8,291 12 10	5,118 8 11	.....	5,118 8 11	13,410 5 9
VII.—Forest work	.....	1,179 12 2	.....	758 6 1	375 0 0	2,313 2 3	344 0 8	.....	344 0 8	2,657 2 11
VIII.—Forest survey	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
IX.—Experiments on timber	.....	13 0 0	.....	.....	.....	13 0 0	.....	.....	.....	13 0 0
X.—Communications and buildings	.....	1,095 15 6	.....	.....	.....	1,095 15 6	621 5 10	.....	621 5 10	1,717 5 4
Total of A. Conservancy and Working	.....	26,605 10 5	29 0 6	763 14 1	2,877 5 1	30,275 14 1	17,798 15 7	.....	17,798 15 7	48,074 13 8
B.—Establishments.										
I.—Salaries—										
1. Pay of Conservator	12,000 0 0	.....	.....	.....	.....	12,000 0 0	.....	.....	.....	12,000 0 0
2. Pay of executive officers	6,200 0 0	14,639 14 9	.....	.....	4,200 0 0	25,039 14 9	13,353 15 0	.....	13,353 15 0	38,393 13 9
3. Office establishments (a) Direction	3,479 7 7	.....	.....	.....	.....	3,479 7 7	.....	.....	.....	3,479 7 7
3. Office establishments (b) Executive	.....	941 13 4	726 2 10	.....	725 0 0	2,393 0 2	1,842 15 10	75 0 0	1,917 15 10	4,311 0 0
4. Forest conservancy establishments	.....	2,606 4 6	14 0 0	.....	.....	2,620 4 6	6,547 6 2	.....	6,547 6 2	9,167 10 8
5. Timber depôt and work establishments	.....	.....	.....	.....	3,084 0 0	3,084 0 0	84 0 0	.....	84 0 0	3,168 0 0
6. Deputation and special allowances	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
I. Total	21,679 7 7	18,188 0 7	740 2 10	.....	8,009 0 0	48,616 11 0	21,828 5 0	75 0 0	21,903 5 0	70,520 0 0
II.—Travelling allowances—										
1. Conservator	2,685 6 0	.....	.....	.....	.....	2,685 6 0	.....	.....	.....	2,685 6 0
2. Executive Officers	1,272 0 4	4,840 12 0	.....	.....	948 0 0	7,060 12 4	5,150 10 8	.....	5,150 10 8	12,211 7 0
3. Subordinate Establishments	213 0 7	165 9 2	354 7 2	.....	276 12 0	1,009 12 11	275 2 0	.....	275 2 0	1,284 14 11
II. Total	4,170 6 11	5,006 5 2	354 7 2	.....	1,224 12 0	10,755 15 3	5,425 12 8	.....	5,425 12 8	16,181 11 11
III.—Contingencies—										
1. Stationery	.....	4 10 0	.....	.....	6 0 0	10 10 0	4 0 0	.....	4 0 0	14 10 0
2. Office rent, carriage of tents and records	87 14 2	111 10 0	.....	.....	56 11 10	256 4 0	54 10 0	.....	54 10 0	310 14 0
3. Pay of Police guards	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Sundries	444 2 5	460 6 0	1 4 4	.....	512 2 3	1,417 15 0	505 14 10	.....	505 14 10	1,923 13 10
5. Postage	139 4 0	203 9 6	.....	.....	.....	342 13 6	127 4 0	2 2 0	129 6 0	472 3 6
III. Total	671 4 7	780 3 6	1 4 4	.....	574 14 1	2,027 10 6	691 12 10	2 2 0	693 14 10	2,721 9 4
Total of B. Establishments	26,521 3 1	23,974 9 3	1,095 14 4	.....	9,808 10 1	61,400 4 9	27,945 14 6	77 2 0	28,023 0 6	89,423 5 3
Grand total of expenditure	26,521 3 1	50,580 3 8	1,124 14 10	763 14 1	12,685 15 2	91,676 2 10	*45,744 14 1	77 2 0	45,822 0 1	1,37,498 2 11

* Includes Rs. 5,833-4-8 on account of charges incurred by civil officers.

Form No. 22.

FOREST DEPARTMENT, BENGAL.

Annual Abstract Account of the Cash Transactions of the Department during the year 1873-74.

Dr. Cr.

	Rs. A. P.	Rs. A. P.		Rs. A. P.	Rs. A. P.
To Cash in hand on 1st April 1873	2,011 14 0		By Expenditure of the Department	1,37,498 2 11	
„ Revenue received	1,79,366 4 4		„ Remittances to State Treasuries	1,72,719 6 5	
„ Remittances from State Treasuries	1,29,434 15 4		„ Remittances to the Public Works Department by book transfer	6,534 13 6	
„ Advances recovered	39,399 11 2		„ Advances made	32,977 3 5	
„ Cash recoveries of service payments of previous years	60 15 0		„ Provincial services	120 0 0	
„ Refund of Provincial charges	120 0 0		„ Miscellaneous refunds	8 4 0	
„ Unadjusted Receipts	8 4 0		„ Remittances to the Civil Department on account, Vienna Exhibition charges	22 3 0	
„ Value of service books	0 1 0		„ Cash Balance in hand on 31st March 1874	1,179 3 10	
„ Uncovenanted Service Family Pension Fund	648 9 0				
„ Income Tax	10 13 0				
		3,51,059 6 10			3,51,059 6 10
Total		3,51,059 6 10	Total		3,51,059 6 10

Form No. 23.

FOREST DEPARTMENT, BENGAL.

Annual Statement of Outstandings and Liabilities on account of Contractors and Disbursers for the year 1873-1874.

Divisions.	Department Debtor.			Department Creditor.			Balance due.	
	At commencement of the year.	Recoveries in cash and value of supplies and work done during the year.	Total.	At commencement of the year.	Payments made during the year.	Total.	To Department (Outstandings.)	By Department (liabilities.)
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Cooch Behar	.....	21,520 11 6	21,520 11 6	13,832 6 2	13,721 1 6	27,553 7 8	6,032 12 2	.....
Bhagulpore	.....	1,190 15 11	1,190 15 11	507 14 2	813 3 9	1,321 1 11	130 2 0	.....
Assam	.....	19,347 7 6	19,347 7 6	3,572 1 9	18,442 14 2	22,014 15 11	2,667 8 5	.....
Dacca	.....	.....	.....	12 0 0	.....	12 0 0	12 0 0	.....
Total	.....	*42,059 2 11	42,059 2 11	*17,924 6 1	32,977 3 5	50,901 9 6	8,842 6 7	.....

	Rs. A. P.
* Difference with Form No. 22	2,659 7 9
Thus :—Amount Credited in Assam under Advances Recovered in previous year for which there were no Debits in Account Current	1,650 0 0
Ditto Admitted items ditto	509 7 9
Ditto Recovered in Cash, Credited as Revenue	500 0 0
Total	2,659 7 9

	Rs. A. P.
* Closing Balance of last year as per annual report	11,927 3 7
Add—Amount added to the opening Balance of the Cooch Bahar division by transfer	5,997 2 6
Total	17,924 6 1

Form No. 24.

FOREST DEPARTMENT, BENGAL.

Statement of Timber brought to Depôt from the different Forest Divisions during the year 1873-74.

Name of River or Division.	Forest.	Description of Timber.	Pieces.	Cubic feet.	Total of each River or Division. Pieces.	Total of each River or Division. Cubic feet.
Cooch Behar	Siliguri	Toon planks	112	23	120	23
	Alipore	Khalakambas	6	.....		
	Duduah	Ditto	2	.....		
Assam	Gowhatty	Sal logs	61	1,105	518	11,188
	Kukurmara	Ditto	201	4,611		
	Kulshi	Ditto	84	1,761		
	Ditto	Khala kambas	28	.....		
	Golaghat	Hulluck logs	10	277		
	Ditto	Nahor ditto	61	1,143		
	Ditto	Ajhar ditto	60	2,246		
	Ditto	Jamu ditto	1	40		
	Ditto	Miscellaneous ditto	6	.....		
	Ditto	Boats	6	.....		
		Total			638	11,311

Form No. 25.

FOREST DEPARTMENT, BENGAL.

Annual Timber account for 1873-74.

Particulars.	Pieces.	Total.	Particulars.	Pieces.	Total.
I.—Stock in hand at the following depôts at commencement of the year.			I.—Timber removed by purchasers from depôts		
1. At station depôts—			*Cooch Behar Division.*		
Cooch Behar Division.			Logs ... 1,084		
Logs ... 1,592			Planks and scantling ... 199		
Sleepers ... 14,397			Khalakambas ... 123		
Planks and scantling ... 505				1,406	
Khalakambas ... 91			*Assam Division.*		
	16,585		Logs ... 296		
Assam Division.			Khalakambas ... 6		
Logs ... 41	41		Boats ... 6		
2. At forest depôts—				308	
Cooch Behar Division.					1,714
Logs ... 5,229			II.—Timber lost or used by the Department—		
Sleepers ... 11,078			*Cooch Behar Division.*		
Planks and scantling ... 232			Plank ... 1		
Khalakambas ... 126			*Assam Division.*		
	16,665		Logs ... 81		
		33,291			82
II.—Timber received at depots from the forests.			III.—Stock in hand at close of the year—		
1. At station depôts—			1. At station depôts.		
Cooch Behar Division.			*Cooch Behar Division.*		
Planks and scantling ... 112			Logs ... 1,796		
Khalakambas ... 8			Sleepers ... 14,403		
	120		Planks and scantling ... 40		
Assam Division.			Khalakambas ... 452		
Logs ... 484				16,691	
Khalakambas ... 28			*Assam Division.*		
Boats ... 6			Logs ... 148		
	518		Khalakambas ... 22		
	638			170	
			2. At forest depôts.		
			Cooch Behar Division.		
			Logs ... 3,941		
			Sleepers ... 11,072		
			Planks and scantling ... 197		
			Khalakambas ... 62		
				15,272	
					32,133
Total	.....	33,929	Total	.....	33,929

Detail of timber used by the Department:—
Cooch Behar division, 1 plank, repairing office table.
Assam ditto 58 logs, building plantation bungalow.
13 „ washed away by floods.
10 „ written off as useless, (rotten).
Total ... 82 pieces.

Form No. 26.

FOREST DEPARTMENT, BENGAL.

Statement showing the amount realized on account of the different classes of Timber sold during the year 1873-74.

Name of division and description of timber.	Number of logs and pieces.	Cubical contents.	Amount realized and due on account of timber sales.	Average amount per log.	Average cubical contents per log.	Average amount per ton of 50 cubic feet.
Cooch Behar Division.			Rs. A. P.	Rs. A. P.		Rs. A. P.
Logs	1,084	35,605·	13,237 11 4	12 3 4	32·9	18 9 5
Planks and scantling...	199	140·	118 11 5	0 9 6	·73	40 11 10
Khalakhambas	123	.....	130 0 0	1 0 11	.....	.....
Assam Division.						
Logs	296	5,716·	4,557 15 2	15 6 4	19·3	39 13 11
Khalakhambas	6	.....	3 0 0	0 8 0	.....	.....
Boats	6	.....	125 0 0	20 13 4	.....	.....
Total ...	1,714	41,467·	18,172 5 11	10 9 8	26·26	21 14 7
Deduct—Amount due but not yet realized			69 0 0			
Balance... ...			18,103 5 11			
Add—Amount realized on account of former years			17 0 0			
Total shown as Revenue on account of timber sales			18,120 5 11			

Form No. 27.

FOREST DEPARTMENT, BENGAL.

Statement showing the amount expended on account of timber received from the different Forest Divisions during 1873-74.

Divisions.	Number of logs.	Cubical contents.	Timber expenses.	Conservancy expenses, cost of establishments, &c., excluding direction.	Total amount expended, excluding direction.	Average amount paid per log.	Average cubical contents per log.	Average amount paid per 100 cubic feet.	Remarks.
			Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.		Rs. A. P.	
Cooch Behar	1,370*	35,842	3,682 9 3†	4,706 11 6	8,389 4 9	6 1 11	26·	23 6 4	Column 5.—The amount actually incurred for stock for timber purposes has been taken, ⅞ of expenditure for stock (cattle) in Cooch Behar, and ⅔ in Assam has been included. Establishment charges have been taken at ⅛ of the entire establishment charges.
Assam ...	518	11,188	2,061 8 4	5,352 6 1	7,413 14 5	14 4 11	22·	66 4 3	
Total ...	1,888	47,030	5,744 1 7	10,059 1 7	15,803 3 2	8 5 11	25·	33 9 7	

* Includes 1,250 logs carried from forest to market depôts.

† Rs. 6,018 representing credit allowed under orders of the Government of Bengal, in letter No. 4,596, dated 19th October 1872, in settlement of claims with Mr. Kruger, a former contractor, not taken into account.

(Revised) Form No. 28.

Annual account of Revenue realized in the Forest Department, Bengal, during 1873-74.

Dr. Cr.

RECEIPTS.	Rs. A. P.	DISBURSEMENTS.	Rs. A. P.
Amount of revenue realized in 1873-74	1,79,366 4 4	Amount disbursed in 1873-74	1,37,498 2 11
Deduct— Amount realized on account of previous periods ...	5,346 2 0	*Deduct*— Amount disbursed on account of transactions of previous periods*	8,091 14 1
Balance ...	1,74,020 2 4	Balance ...	1,29,406 4 10
Add— Outstandings on account of the year Rs. 4,241 9 9 Minus for bad debts	4,241 9 9	*Add*— Amount due for transactions during the year under review, but not yet disbursed	950 3 6
Value of the year's transactions	1,78,261 12 1	Real cost of the year's transactions	1,30,356 8 4

	Rs. A. P.
Value of the year's transactions ...	1,78,261 12 1
Cost of ditto ...	1,30,356 8 4
Balance ...	47,905 3 9
Add— Difference between the value of stock at commencement and close of the year	31 8 4
Net results of the year ...	47,936 12 1

* Includes Rs. 7,074-12-6 paid on account of credit allowed for removing 468 logs to depôts in 1871-72, to Mr. Kruger, a former contractor; by order of the Government of Bengal, contained in their letter No. 4,596, dated 19th October 1872.

Explanation of difference between the value of stock at commencement and close of the year 1873-74.

	Sale value of excess stock at close of the year.	Sum required to replace deficiency at close of the year.	Difference	
			In favor of the year.	Against the year.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Timber, 1,287 pieces at Rs. 6-8-0 each	.....	8,365 8 0	.....	8,365 8 0
,, 129 ,, ,, 5-5-7 ,, ...	680 0 0	.....	680 0 0	.....
Other stock	7,717 0 4	.....	7,717 0 4	.....
		Total ...	8,397 0 4	8,365 8 0
		Deduct—Balance against the year	8,365 8 0	
		Net balance in favour of the year ...	31 8 4	

FOREST DEPARTMENT, BENGAL.

Area of Reserved Forests in 1873-74.

Reserved Forests.	Area in 1872-73.	Added during the year.	Excluded or transferred to other heads.	Total remaining in 1873-74.
Cooch Behar Division.	Sqr. miles.	Sqr. miles.	Sqr. miles.	Sqr. miles.
Sikkim sub-division ... ... Hill tracts	75·	.....	.....	75·
Sikkim sub-division ... ... Terai...	31·	.....	.....	31·
Western Dooars sub-division ... Mooraghat forest	.....	12·	.....	12·
Western Dooars sub-division ... Dainah sissu forest	.....	1·8	.....	1·8
Assam Division.				
Kamroop district ... ... Matiakar (sál forest)	3·5	.....	.....	3·5
Kamroop district ... ... Bordooar (ditto)	28·	.....	.....	28·
Kamroop district ... ... Pantan (ditto)	12·	.....	.....	12·
Nowgong district ... ... Kholahaut (ditto)	7·5	.....	.....	7·5
Nowgong district ... ... Deboka (ditto)	3·25	.....	.....	3·25
Nowgong district ... ... Mikkir hill (mixed evergreen)	65·	.....	.....	65·
Seebsaugor and Naga Hills district Nambor (ditto)	100·	.....	.....	100·
Durrung district ... ... Khalingdooar (reserve)	.....	9·75	.....	9·75
Durrung district ... ... Balipara (ditto)	.....	87·8	.....	87·8
Durrung district ... ... Kulshi plantation (ditto)	.....	5·5	.....	5·5
Total	320·25	116·85	.....	437·10

FOREST DEPARTMENT, BENGAL.

Area of Unreserved Forests in 1873-74.

Unreserved Forests.	Area in 1872-73.	Added during the year.	Excluded or transferred to other heads.	Total remaining in 1873-74.	Remarks.
	Sqr. miles.	Sqr. miles.	Sqr. miles.	Sqr. miles.	
Cooch Behar division	765	.....	436	329	422 square miles transferred to Assam. 14 „ „ declared reserves.
Chittagong „	5,670	.....	.....	5,670	
Total ...	6,435	.....	436	5,999	
Assam division	4,565	422	103	4,884	422 square miles received from Cooch Behar division. 103 square miles declared reserves.
Dacca „	4,000	.....	.....	4,000(?)	
Total ...	8,565	422	103	8,884	
Grand Total ...	15,000	422	539	14,883	

FOREST DEPARTMENT, BENGAL.

Area of plantations for the year 1873-74.

Name of plantation.	Area in 1872-73.	Total cost.	Area added during 1873-74.	Amount expended during 1873-74.	Total area up to 1873-74.	Total expenditure incurred up to 1873-74.	Remarks.
Cooch Behar Division.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	
Rungbool	450	9,195 0 6	.....	209 0 9	450	9,404 1 3	Since the close of the year it has been discovered that the area of this plantation, laid out in 1868 and 1870, is only about one-third of that entered in the books. A survey of it is now being made and the necessary correction made in next year's report.
Dhobi jora	42	32 0 0	.....	.....	42	32 0 0	The area of this plantation will also be verified.
Bamunpokree	69	3,589 15 10	22	6,001 15 6	91	9,591 15 4	According to survey made during the year.
Ditto India rubber ...	.....	.....	.....	100 8 3	.....	100 8 3	Failure, no area entered.
Mahanuddy	14	45 8 0	.....	.....	.....	45 8 0	Area has been struck off, failure.
Gulma	14	103 8 0	.....	.....	.....	103 8 0	Ditto ditto ditto.
Ramshai Hat	.....	133 13 6	.....	.....	.....	133 13 6	
Fallacotta	3	204 4 11	.....	.....	3	204 4 11	
Chittagong Division.							
Sitapahar	8	410 13 9	2	226 14 9	10	637 12 6	
Kasalong...	.....	4 10 0	.....	.....	.....	4 10 0	
Pahartulli	5	324 14 6	.....	.....	5	324 14 6	
Holingamara	.....	300 0 0	48	1,718 15 7	48	2,018 15 7	
Total of Bengal ...	605	14,344 9 0	72	*8,257 6 10	640	22,601 15 10	
Assam Division.							
Makoom (teak) ...	4·	536 12 6	7·	510 12 0	11·	1,047 7 6	
Tippun Hill (do.) ...	.....	.....	·5	38 8 0	·5	38 8 0	
Kulshi ... (teak) ...	8·	411 13 6	25·	2,196 7 11	33·	2,608 5 5	
Kulshi ... (rubber) ...	.....	.....	35·	377 13 0	35·	377 13 0	
Kulshi ... (sissu) ...	.....	.....	10.	481 7 8	10·	481 7 8	
Balipara (rubber) ...	.....	.....	180·	415 3 6	180·	415 3 6	
Shillong tree-nursery (under the Deputy Commissioner, Khasi Hills)	5	.....	.....	1,098 5 10	5·	2,004 10 11	
Total of Assam ...	17·	1,854 15 1	257·5	5,118 8 11	274·5	6,973 8 0	
Total ...	622·	16,199 8 1	329·5	13,375 15 9	923·5	29,575 7 10	

* Rs. 34-6 excess shown in Form No. 21 represents cost of supplying seeds, &c., to other provinces.

FOREST DEPARTMENT, BENGAL.

Area of Forest tracts protected from fire up to 1873-74.

Forests.	Area in 1872-73.	Total cost.	Additional area protected in 1873-74.	Amount expended in 1873-74.	Total area protected up to 1873-74.	Total expenditure incurred up to 1873-74.
Cooch Behar Division.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	Acres.	Rs. A. P.
Mooraghat	420	30 2 0	7,260	31 8 0	7,680	61 10 0
Sivok	...	.....	.....	136 7 6	.....	136 7 6
Assam Division.						
Pantan	...	.....	3,200	37 1 0	3,200	37 1 0
Bordooar	...	.....	6,400	21 10 0	6,400	21 10 0
Matiakar	...	.....	640	14 0 0	640	14 0 0
Kholahaut	...	.....	960	9 12 0	960	9 12 0
Balipara	...	.....	320	10 0 0	320	10 0 0
Total	420	30 2 0	18,780	260 6 6	19,200	290 8 6

FOREST DEPARTMENT, BENGAL.

Prosecutions for breaches of Forest Rules during 1873-74.

Divisions.	Number of prosecutions.		Convictions obtained or still pending.			
			Number of cases.		Number of persons.	
	Number of cases.	Number of persons.	Convictions.	Pending.	Convicted.	Under trial.
Cooch Behar	5	9	4	1	4	1
Assam	7	14	2	.....	6	.....
Total	12	23	6	1	10	1

A. L. Home, *Deputy Conservator of Forests,*
In charge, Office of Forest Accounts, Bengal.

APPENDIX I.

FORM I.—*List of Trees, Shrubs, &c., observed in the Eastern Sunderbuns, by* A. L. HOME, ESQ., *Deputy Conservator of Forests, Bengal, December* 1873 *to January* 1874.

No.	Systematic names.	Local names.	REMARKS.
1	Heritiera littoralis ...	Sundree ...	A hard, heavy wood. Grows a tree to 50′ and occasionally over in height; a brownish red timber, used extensively for beams, buggy-shafts, flooring, and boat-building planks, posts for building purpose, and furniture. Also for masts and rudders.
2	Averrhoe carambola...	Kamrang ...	Said to grow to a tree; a hard reddish timber, fruit eaten by natives. Timber valued, and used for building purposes, and furniture.
3	Sonneratia acida ...	Orcha ...	Grows to a tree. Yields a white light wood, but said to be very hard and durable. Fruit eaten by natives.
4	Carapa sp: ...	Badul ...	Grows to a fine large tree producing a reddish brown heavy wood; planks used for boat building.
5	Euphoria Danura ...	Nuncha ...	A tree attaining a height of 50′ and a girth of 5′. Producing a white timber used for boat-building planks, and also for building purposes, flooring, &c.
6	Cyclostemon subsessile	Bun-bokul ...	Grows to about 40′ in height, and to 4′ in girth. Produces a white timber used for planking, &c. Occasionally met with only.
7	Diospyros Embryopteris.	Gab ...	Grows to a tree 30′ to 40′ in height, and to 5′ in girth. Wood used for fuel. Fruit (bright red when ripe) eaten by natives. The seeds are crushed and mixed with water, when the tar like production of this process is smeared over the outside of boats to to render their planks hard and water-tight.
8	Carapa obovata ...	Poshoor or Dhundul	Grows to a tree producing a deep red wood, used for building purposes.
9	Avicennia tomentosa	Bani ...	A tree which grows generally along the edges of rivers and nullahs; gives a white, heavy wood, very brittle, of no use for anything but fire-wood. Bears a round seed-case about 1¼″ long, containing a single bean-shaped seed, and very small yellow flowers.
10	Sonneratia apetala ...	Keowra ...	Grows to a tree on the banks of rivers in these parts. Wood used for planking, &c.; not much prized.
11	Croton drupaceum ...	Nun bhantwi ...	A flowering shrub growing to about 10′ in height. Has a small white scented flower. Wood used as fuel; leaves boiled down and applied as poultices to sprains, &c. Very occasionally met with.
12	Petunga Roxburghii	Jhijir ...	Grows to a small tree about 15′ in height; produces a hard, pure, white wood, used for making boxes and native furniture. Has a small white flower; only very occasionally met with.
13	Pongamia glabra ...	Dalkaramcha ...	Grows to a tree gives a light, white timber, used for oil-mills and fire-wood. The seed produces an oil of a red colour; used by natives medicinally.
14	Ceriops Roxburghiana	Goran ...	Grows occasionally to 35′ in height, but generally attains a girth of 1·5′ only; wood used extensively for posts in native buildings, and also for firewood. Heart-wood a deep dull red colour, very hard and tough; bark used for tanning.
15	Excœcaria Agallocha	Gengwa ...	Grows occasionally to 5′ girth, and 40′ in height, though generally cut for posts when of small girth. Useful wood for general carpentering purposes, such as toys, bedsteads, tables, &c.; &c.; a white timber. The juice which exudes from the bark when green is very poisonous.
16	Amoora Cucullata ...	Amur, or Latmi, or Nutmi.	Grows in favorable localities to 40′ and 50′ in height, attains a girth of 2′ to (occasionally) 3′; wood used for posts for building purposes, and firewood; heart-wood very hard and of white color; a very heavy timber.
17	Afzelia bijuga ...	Shoondal or Hingch	Grows to a tree, producing a white, light timber, used for packing-cases, &c.
18	Bruguiera gymnorhiza.	Kakra, or Gurjun	Grows to a 3′ feet, and occasionally 4′ feet girth, throwing out aerial roots from 8′ to 12′ up the main trunk, which forms a circle round a full grown tree of 8′ to 10′ in diameter; a hard brittle wood, not extensively used, and when used, for fire wood only.
19	Hibiscus tiliaceus ...	Bola or chelwa ...	A straggling, crooked growing shrub; wood used as fuel, bark for rough ropes for binding fire-wood on boats. Has a red flower.
20	Agati grandiflora ...	Bagful ...	Grows to a tree, producing a white timber, light; used for posts in native houses and for firewood.
21	Ficus nitida ...	Zir ...	Grows to a tree; gives a white, hard and brittle wood, used as fuel only; said to bear a very small bright red flower at the end of each little branchlet behind the leaves.
22	Heritiera? ...	Tap. Sundree ...	A spreading shrub, growing to about 5′ in height. Wood used as fuel.
23	Cynometra bijuga ...	Shingr ...	Grows to about 3′ girth occasionally; a small tree, white hard wood; small white flower, and small round seed-pod, containing a single seed. Wood used for posts in native huts, and as fuel.
24	Tamarix gallica ...	Jhau ...	A very common shrub in some parts, grows to about 9′ in height; wood used occasionally as firewood.
25	Clerodendron Siphonanthus.	Baunhatti ...	A flowering shrub, bearing a deep red flower. Its wood is said to be used as a charm, tied round the neck, for various ailments.
26	Excœcaria Indica ...	Batul ...	A shrub, grows to about 6′ in height, said to have a small white flower growing in clusters; sweet scented. Wood used as fuel.
27	Clerodendron inerme	Butraj ...	A flowering shrub, bears a bell-shaped white flower; gives a white wood used occasionally as fuel.
28	Briedelia scandens ...	Harinhara ...	A shrub, small white flower; wood, white. Used for fuel only.

APPENDIX I.—(*Continued.*)

No.	Systematic names.	Local names.	Remarks.
29	Cerbera odallum ...	Dabur or Dhakur	A flowering shrub, white flower, grows to 7′ and 8′ in height; wood used occasionally as fuel.
30	Barringtonia racemosa	Bun-badam ...	A small tree, grows to about 14′ in height and 1′ in girth, wood occasionally used as fuel.
31	Kandelia Rheedei ...	Guria ...	A shrub, grows to about 11′ in height, and used occasionally as fuel.
32	Salacia Coromandeliana.	Shingl ...	A small shrub, grows to about 6′ in height; wood used as fuel.
33	Loranthus buddleioides.	Rangin ...	A flowering shrub; has a small bright red flower.
34	[?] ...	Golpatta ...	Leaves used extensively for thatching in Calcutta and throughout the villages and towns near the Sunderbuns.
35	Derris uliginosa ...	Kelia-lota ...	A creeper. Its wooden stem is used by boatmen for tying logs on to boats.
36	Calotropis gigantea...	Akund ...	A weedy looking, flowering shrub; grows to about 7′ in height, and bushy. Flowers used as offerings to sacred shrines. Leaves used for poultices on strains and bruises. Charcoal of this shrub is used in manufacture of country gun-powder.
37	Acrostichum aureum...	Dhekwa ...	A fern, used occasionally for thatching; grows to about 3′ in height.

A. L. Home,
Deputy Conservator of Forests,

APPENDIX II.

Statement showing results of forest valuation survey of the Eastern Sunderbuns (sundree, timber forests). Area 1,083 *square miles.*

No.	Position of line of Survey.	TREES MEASURED.																				Area of survey in acres.
		Sundree.					Shingr.			Nutmi.			Gengwa.			Bani.					
		I.	II.	III.	IV.	V.	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.	IV.	V.	
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	A. R. P.
1	North-north-east into block No. 206 from small nullah running north-north-west out of Seepsah river, 6,300 feet	17,331	1,852	2,015	451	2	345	41	7	1,161	63	15	.....	.....	...	2	...	6	4	1	14 1 34
2	North-north-west into block No. 208 from a point in the Seeepsah river, 5,700 feet	29,482	2,832	1,936	418	2	579	14	1	1,839	4	12	.....	.....	...	1	4	2	...	1	13 0 13
3	Into block No. 230 from a point on the Mamki khal, first north-east, then east, and again north-east, 5,760 feet	38,392	8,470	2,663	257	3	3,129	314	61	.....	...	...	.....	.....	...	...	...	...	...	...	13 0 35
4	Into forest from khal, taking off west of Chota Sella river in unallotted portion, east of Pursur river, north-north-east, 5,340 feet	27,840	3,669	1,797	142	1	.....	...	...	474	20	3	6,223	2,585	162	4	7	...	2	6	12 1 1
5	Into forest from khal, taking off east-south from Chota Sella river, about middle of unallotted portion east of Pursur river, north 4,410 feet	24,576	2,260	1,691	109	1	.....	...	...	634	141	8	2,161	774	192	56	31	8	17	3	10 0 19

1.—First through undergrowth of golpatta and hurtal with young sundree interspersed with creepers. Afterwards, forest much more open, with dense undergrowth of fine, healthy, straight young sundree, occasional shingr and nutmi seedlings; counted 138 dead sundree, all mature, fallen and standing; which would appear generally to have died off from their tops. Sundree seedlings absolutely cover the ground all around. End of line brought up by impassable nullah.

2.—For 1,250 feet through dense undergrowth of golpatta and sundree saplings covered with kelia creepers. Afterwards, almost pure young sundree undergrowth, extremely densely packed, the whole of very vigorous and healthy growth, with occasional shingr and nutmi seedlings intermixed. Counted 126 mature and dead sundree, standing and fallen. Measured a fine old hollow poshur, outside the line, 13'8" in girth; 5' from ground. A large branch at 14' had been blown off.

3.—Through dense undergrowth of kiah and hurtal, intermixed with sundree and shingr seedlings for 620 feet, when the kiah and hurtal gradually disappeared, leaving an undergrowth of almost entirely sundree seedlings, with a few shingr here and there. The sundree in this block is particularly healthy, well-grown timber, the young trees especially have very fine straight trunks to 30 feet, without branching. Counted 71 mature, and 13 medium (old) sundree stumps and 119 mature trees of the same, dead, fallen and standing; measured a fine old bani 16' 1" in girth outside line of survey, with hollow trunk, 18' without branching.

4.—During first 520 feet sundree predominated over the gengwa, which order was reversed for next 690 feet, when sundree again predominated, and gengwa gradually became less and less, undergrowth throughout principally sundree seedlings with gengwa, a few nutmi and goran, forest generally open, and free from large creepers. The growth is very straight, but stunted compared with that found in former surveys; most of the mature trees bearing parasites, and having a diseased appearance about the foliage in consequence; met with 69 mature sundree, dead, fallen and standing. The general length of bole does not exceed 18 feet.

5.—Undergrowth almost entirely sundree and other seedlings, very closely packed, sundree predominating everywhere. Growth of all trees very straight and healthy, sundree standing almost perfectly straight to 35,' this being the finest growth met with during the surveys. Felling had recently been carried on about here. Counted 168 mature, and 177 medium, sundree stumps, and 51 mature sundree, dead, standing and fallen. Forest free from large creepers and thorns.

APPENDIX III.

FORM I.—*List of trees observed in the Garo Hills, Manda valley, by* DR. W. SCHLICH, *Conservator of Forests, Bengal, between the 5th and 11th December* 1873.

No.	Name of family.	Systematic name.	Local name, Garo.	REMARKS.
1	Dilleniaceæ ...	Dillenia pentagyna Roxb. ...	Akachi ...	Found everywhere, especially with sál.
2	Ditto ...	Ditto scabella Roxb. ...	Ditto ...	Found here and there, sometimes in good numbers.
3	Terustoemiaceæ ...	Schima Wallichü ...	Boldak ...	Either the same, or very nearly the same as cheloni, found in most parts, and in fine specimens.
4	Dipterocarpeæ ...	Shorea robusta ...	Bolsal ...	Found in most parts, but only in certain spots in large numbers.
5	Malvaceæ ...	Kydia calycina Roxb. ...	Boldobak ...	Wood soft; tree used for propagation of lac insect.
6	Ditto ...	Bombax malabaricum ...	Bolchü ...	Not very frequent.
7	Sterculiaceæ ...	Sterculia Villosa (?) ...	Udaro ...	Tree not very frequent. Bark used for head-bands, on which the Garos carry their loads.
8	Ditto ...	Acerifolium ...	? ...	
9	Ditto ...	Sterculia colorata ...	Bolasong ...	Small tree; not used.
10	Burseraceæ ...	Garnga pinnata ...	Chitompa ...	Found everywhere; apparently not used.
11	Ditto ...	Canarium Bengalense ...	Tekreng ...	Used for house-posts; fruit which ripens in August. is eaten.
12	Meliaceæ ...	Guarea Mollis-Wall ...	Bolashin ...	Large tree; not used.
13	Ditto ...	?	Tebrat ...	Large tree; not used.
14	Sapindaceæ ...	Aesculus punduana-Wall ...	Bolnawak ...	Not used.
15	Anacardiaceæ ...	Mangifera Indica' ...	Tegachu ...	Planted only.
16	Ditto ...	Semecarpus anacardium ...	Bawarœ ...	Marking nut tree.
17	Ditto ..	Spondias mangifera ...	Tongrong ...	Wood not used.
18	Therebintaceæ ...	Rhus sp. (?) ...	Koti ...	Not used.
19	Leguminosœ ...	Erythrina sp. ...	Mandal ...	Some fine tall specimens were observed.
20	Ditto ...	Butea frondosa ...	Palash ...	Found chiefly in the plain near Damra.
21	Ditto ...	Cassia fistula L. ...	Sonaru ...	Not used.
22	Ditto ...	Banhinia sp. ...	Bagbakal ...	
23	Ditto ...	Ditto ...	Mœgong,	
24	Ditto ...	Albizzia stipulata ...	Selcho ...	Used for boats.
25	Ditto, ...	Ditto procera Bth. ..	Kili ...	Used for boats.
26	Ditto ...	Derris robusta ...	Bolkakarü ...	Not used.
27	Combretaceæ ...	Terminalia Belerica Roxb. ...	Chiroroe ...	Frequently met with.
28	Myrtaceæ ...	Eugenia jambolana ...	Chambu ...	Wood used.
29	Ditto ...	Careya arborea ...	Dambel ...	Found everywhere, especially with sál.
30	Lythrariæ ...	Lagerstrœmia Reginæ ...	Bolashari ...	Only a few specimens seen.
31	Ditto ...	Ditto parviflora ...	Shida ...	Found everywhere.
32	Ditto ...	Duabanga sonneratoides ...	Bondorkella ...	
33	Datiscæ ...	Tetrameles nudiflora R. Br.	Bolong ...	Large tree; used for boats.
34	Rubiaceæ ...	Nanclea cordifolia Roxb ...	Shangdong ...	Used for boats; tree attains a good size.
35	Apocynaceæ ...	Hollarrhena anti-dysenteria	Madmandœ.	
36	Bignoniaceæ ...	Calosanthes Indica (?) ...	Kering.	
37	Ditto ...	Stereospermum chelonioides	Bolzol ...	Large tree, used for boats.
38	Verbenaceæ ...	Callicarpa arborea ...	Makanchi ...	Found everywhere.
39	Ditto ...	Vitex penduncularis Wall ...	Shelangri ...	Used for sugar-cane crushers and such like purposes.
40	Ditto ...	Gmelina arborea ...	Bolkobak ...	Wood used in house building.
41	Laurineæ ...	Tetranthera monopetala R.	Bolbek ...	Wood not used. (Leaves used for feeding the Muka silk-worm, but not in Garo Hills.)
42	Laurineæ ...	Beilschmiedia Roxburghü ...	Tapchi ...	Not used.
43	Euphorbiaceæ ...	Macaranga gummi flua ...	Chakro.	
44	Ditto ...	Briedelia retusa	Kashi ...	Wood sometimes used in house building.
45	Ditto ...	Emblica officinalis ...	Ambari ...	Found here and there.
46	Ditto ...	Bischoffia javanica ...	Bolzuru ...	Used for boats.
47	Urticaceæ ...	Artocarpus integrifolia ...	Teprong ...	Planted only.
48	Ditto ...	Fiscus elastica ...	Ranket ...	Only one seedling observed. The tree is supposed to exist in other parts of the hills.
49	Ditto ...	Fiscus Indica L. ...	Ditto ...	Not numerous.
50	.....	Ditto Laccifera Roxb. ...	Prab ...	A few specimens.
51	.....	Ditto Infectoria ...	Do. ...	Numerous.
52	.....	Ditto Cordifolia Roxb. Rumphü D. C.	Do. ...	
53	.....	Ditto Triloba Ham ...	Chrom ...	Only met one seedling.
54	.....	Ditto Hispida Lf. ...	Shakab ...	The edible fig.
55	Juglandaceæ ...	Engelhardtia spicata ...	Vakrü ...	Large tree; not used.
56	Cupuliferæ ...	Quercus lanceœfolia ...	Chauko ...	Besides these five species, there are probably others They are usually found near water-courses. The wood is very little used.
57	Ditto ...	Ditto sp. (new) ...	Ditto ...	
58	Ditto ...	Castanopsis hystrix D. C. ...	Ditto ...	
59	Ditto ...	Ditto Argentea D. C. ...	Ditto ...	
60	Ditto ...	Ditto sp. ...	Ditto ...	
61	.....	... ...	Dekumbi ...	Wood soft, sometimes used for paddles.
62	.....	... ...	Gornok.	
63	.....	... ...	Gambal ..	Pretty frequent; wood said to be used for rice pounders†
64	.....	... ...	Shilka ...	Used for boats.
65	.....	... ...	Rodia ...	Not used.
66	.....	... ...	Tacko ...	Fruit, which ripens in August, eaten.
67	.....	... ...	Kidar ...	Fine large tree; wood not used.
68	.....	... ...	Bolcheck ...	Not used.
69	.....	... ...	Bolbock ...	A tree resembling simul in general appearance; out of leave in December.
70	.....	... ...	Tatopa ...	Wood not used.
71	.....	... ...	Dongbeng ...	Very large tree; leaveless in December; wood not used
72	....	... ...	Balsam pal ...	Not used.
73	.....	... ...	Kamkal ...	Ditto.
74	.....	... ...	Pagram ...	Bark used for manufacturing cloth.
75	.....	... ...	Dome ...	Resembles toon in appearance; wood not used
76	.....	... ...	Rudeck ...	Very large tree, wood not used.
77	....	... ...	Temisak ...	Not used.
78	.....	... ...	Vakrü ...	Large tree; not used.
79	Gramineæ ...	... ...	Wah ...	A great variety of bamboos are found all over the forests, and in large quantities.

CALCUTTA,
The 2nd January 1874.

W. SCHLICH,
Conservator of Forests, Bengal.

APPENDIX IV.

General description of the Sivok Hill Range, by J. S. GAMBLE, ESQ., B.A., *Assistant Conservator of Forests, Cooch Behar Division.*

1. *Area.*—The area of the Sivok Hill Range is as follows:—

Lower Hill forest	11·45 square miles.	(7328 acres).
Hill Savannah	4·55 square miles.	(2912 acres).
Total ...	16·	„	or 10240 acres.

2. *Boundaries and the properties with which they march.*—The range is bounded on the north by the crest of a ridge called Silimbong, stretching from Sittong Nita (7,000 feet) to the Teesta river; on the west by a continuation of the same ridge passing over Sittong to Letpanchar; on the east by the Teesta river, and on the south by the Sivok river.

3. *Topographical description.*—The tract consists entirely of hills with very steep and rugged cliffs, especially on the south face. It consists of two parts—

1*st.* The spurs and slopes coming down from the Sittong range of hills towards the south and east. 2*nd.* The Sivok Hills bounded by the Teesta, Sivok, and Ruyem rivers, and joining the Sittong ridge at the water-shed of the Sivok and Ruyem rivers.

The first part consists chiefly of tolerably gentle slopes, the upper parts being yearly joomed for cultivation by the Lepchas, and wherever abandoned showing merely a thicket of '*Artemisia*' '*Moesa*' and other worthless plants and shrubs, with perhaps occasionally stump-shoots of the old trees which have been cut down.

The second part is all forest—virgin forest,—which, beyond the cutting of sâl trees to a certain extent on the east and south slopes, has never been worked in any way. The southern face consists of a steep precipice with a few spurs narrow and steep, running off parallel to each other towards the Sivok river.

The chief *rivers* are—

1*st.* The *Teesta*, on the east boundary, always running but hardly navigable, although the natives occasionally take their light dug-out sâl canoes over the rapids. For timber which will float it is very good; but the difficulties of floating sâl and other heavy timber over the cataracts have been found very great. From the junction of the Teesta and Sivok rivers downwards, there are no difficulties in the way of floating.

2*nd.* The *Sivok* river, runs the whole year round, but has only during the rainy season sufficient water for floating.

3*rd.* The Ruyem river, which, with its numerous branches, drains the whole of the interior portion of the tract.

Of *roads* there is only one, which is now in course of construction, viz., that along the bank of the Teesta river. When this is finished, it will be possible to utilize it for the extraction of timber in scantlings.

4. The *soil* is sandy, being towards the south of tertiary sand stone, which is followed by a belt of carboniferous and then by schist rocks and slates.

The coal is good but not very pure, and is not found in sufficient quantity to be worth working. However, no one as yet has attempted to penetrate below the surface of the ground. 'Tufa' lime has been found in one or two of the small rivers running south, but not in very large quantity. The slates of the upper portion seem pure, but they do not split well. Mr. Mallet, of the geological survey, has explored this tract during the past cold season, and has given me some information on its geology.

5. *Description of forests as to species, age, and condition.*—It has been found impossible to divide this tract into different classes of forest except those of 'Lower Hills' and 'Savannah,' owing to the difference between the vegetation of the ridges and slopes, and that of the beds of the rivers.

The tops of the ridges of the Sivok Hills up to about 2,500 feet altitude are covered with dry forest, the chief tree being *sâl*, which is there found in its finest state; some very large specimens have been met with, but chiefly in out of the way parts, as lower down, the larger trees have mostly been cut out for timber supply.

The growth of the hill sâl appears to be rapid, and the young trees are exceedingly vigorous. In some parts they grow so thick together, as to be difficult to penetrate, and they invariably have fine straight stems.

With the *sâl* are found *saj*, cheloni, and katoos of large size; together with a few champ, wild mango, and most of the trees peculiar to sâl forest. The undergrowth is chiefly of a strong bamboo-like grass (*Erianthus sp.*) together with other grasses, such as *Apluda Saccharum* and *Pogonanthera.*

Small plants of the saj (*cinnamomum albiflorum*), which is exported in considerable quantities, and of which trees between five and six feet girth have occasionally been seen, are very common; as also is the Hurdi (*Morinda lanceolata*) also an article of export.

The upper ridges are very steep, and are chiefly remarkable for the prevalence of two very rare palm trees the 'Katong' (*Wallichia disticha Tand*) and the schap. (*Phœnix rupicola Tand*). Both of these are very liable to be exterminated, as the Lepchas eat the centre of the stem of the one, and obtain a kind of sago from the other, as they do also from the Runghong (*Caryota urens*), found in the moist valleys and occasionally on the ridges. *Pandanus* is also common. In the hollows between the ridges, where the soil keeps damp, *toon* is found sometimes of large size, and here and there the India rubber tree (*Ficus elastica*). The slopes of the spurs are covered generally with a kind of moist evergreen forest of large trees, but with the exception of *toon*, a few *saj* and *cheloni*, the trees are not very valuable ones. We find, however, '*Artocarpus chaplasha*,' *Pongamia glabra*,' *Pterospermum acerifolium*,' *Populus ciliata*,' '*Quercus spicata*,'and an innumerable quantity of other species. The undergrowth is not generally dense, although it is composed in a great measure of canes, *calamus montanus Tand*,' '*Schizospathus griff*' being especially noticeable.

On the dryer southern slopes the ground is covered with a big bamboo (*Dendrocalamus sp*), and with it the common trees are, '*Bombax*,' '*Erythrina*,' '*Gmelina*,' '*Bauhinia variegata*,' *saj* and a few sâl.

The valleys of the small rivers contain the finest vegetation, and on proceeding up them we find a new delightful picture at every step. The principal trees are *Pani saj* (*Terminalia Myriopteron*), *toon*, *Katus*; (under this head we have counted both '*Castanea Indica*' and '*Castanopsis Roxburghii H. F. T.*) and with them are found '*Chalta*,' '*Hattipaila* '*Garcinia*' '*stipulata*,' '*Calophyllum polyanthum*,' '*Ulmus lanceæfolia*,' '*Meliosmia simplicifolia*' '*Talauma Hodysoni*,' &c., &c. The smaller trees are chiefly species of '*Homoroya*,' '*Citrus*,' '*Alsodeia*' '*Micromelum*,' '*Viburnum*,' '*Casearia*,' '*Cyclostemion*' '*Aporosa*; while below them again we have canes of all sorts, the commonest being '*Calamus schigospatheus*' '*flagellum*' and *leptospadix*; the dwarf *Areca gracilis*, the wild plantain; two species of *Leea*, and a multitude of *Rubiaceæ*, *Piperaceæ*, &c.

Towards the Sivok river is a strip of level land, alternately moist and dry, and containing the trees of the Terai, such as *Sterculia villosa*, *Lagerstroemia parviflora*, *Bauhinia variegata*, *Terminalia chebula*, and *Belerica*, &c., &c.

But the chief tree and the most valuable is the India rubber, (*ficus elastica*). It is found chiefly along the beds of the rivers in a kind of sandy clay, very friable, but examples are met with occasionally on the slopes and even on the tops of the ridges.

It is commoner towards the east in the feeders of the Teesta, than to the south; and appears to be very local, as in some places a great many are found growing not far from each other, while in others in many days survey hardly one has been met with.

The upper ridges towards Sittong have been so much 'joomed' by the Lepchas, that their original vegetation is not easily made out; it appears, however, that toon existed in large quantities, with the oak, alder, birch, chestnut of the upper hills, and such trees, as the *Ostodes paniculata*, *Talauma Hodgsoni*, *Eugenia cerasifolia*, &c. For the list of the trees of the whole tract, reference must be made to the general list of Darjeeling trees, as this, tract contains specimens of almost all kinds.

6. *Timber Depôts.*—Of these there is only one, viz., Sivok at the junction of the Teesta and Sivok rivers, at the extreme south east corner of the tract.

7. *Timber Markets and large towns in the vicinity.*—From Sivok timber depôt, timber may either be floated down to Julpigoree by the Teesta river or carted to Silligori or other points on the Ganges Darjeeling road. There are few villages on the borders of the forest with the exception of Letpaucha, Lumbong, the coolies villages of the Government cinchona plantation, and Sivok.

8. *Lines of export.*—Down the Teesta river, to Julpigoree and the Brahmaputra, by road to Silligori.

9. *List of villages remaining within the forest boundaries, limits of each, and rights on the forests possessed by the inhabitants.*

These are: 1*st*, *Sivok.*—The forest house, a few shops and the lines of coolies employed by the Public Works Department on the Teesta valley road. Merely a very small area, the inhabitants have no cultivation and no rights whatever on the forests.

2*nd.*—The three villages of Lumbong, Lunkor, Kermoth, under Duli Sing, Lepcha Mundle. They are in the upper parts of the ridges, and very scattered.

There are 16 settlers who pay Re. 1 each per month to the Forest Department as rent.

Their cultivation is joom; they grow chiefly maize, murwa, (*Elensine coracana*), hill-rice, &c. Of the area under cultivation, and that spoilt by jooming, report will be made after closer inspection.

10. *Statement of rights possessed by the inhabitants of the surrounding districts in respect to grazing cattle, fuel, grass, bamboos, &c.*—None exist.

11. A map of the range on a scale of two inches to the mile has been prepared.

12. *Working plan.*—The materials necessary for a preliminary working-plan are: (1.) *Area of the different classes of forest*, this has been given under 1. (2.) *Amount of growing material*, see form 2 appended. (3.) *Rate of growth*; data as yet incomplete. It is hoped that some indications on this point will be soon be ready, as collections of sections of wood of the different trees are being made.

DARJEELING,
The 22nd June 1874.

J. S. GAMBLE, B.A.,
Assistant Conservator of Forests,
Cooch Behar Division.

APPENDIX V.

APPEN

FORM II.—*Statement showing the results of Forest Valuation Surveys in the Sivok Hill range.*

Number.	Position of Line of Survey.	Trees																												
		Sal.											Saj.																	
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	I.		
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Between 10-11 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Between 10-11 cubits.	Between 11-12 cubits.	Between 12-13 cubits.	Between 13-14 cubits.	Between 14-15 cubits.	Under 1 cubit.	Between 1-2 cubits.	
1	From a point on the Sivok river up the first ridge between the Teesta river and Chanwa Jhora, 7,530 feet.	5,790	106	66	43	20	8	3	2	1	...	...	2	11	12	13	10	6	4	...	2	1	...	...	...	...	...	26	34	
2	Along the Chanwa Jhora from the Sivok river upwards; 6,600 feet.	20	3	4	...	...	...	..	...	...	...	.	6	3	8	6	1	4	2	...	...	...	...	...	...	...	...	2	...	
3	From a point on the Sivok river up the second ridge between the Chanwa and Tanwa Jhoras, 4,770 feet.	3,161	86	44	18	4	1	1	...	1	...	...	1	2	2	7	5	2	...	1	...	...	...	...	...	...	...	19	37	
4	Along the Tanwa Jhora from the Sivok river upwards, taking two branches— ft. Main stream ... ... 4,970 Branch No. 1 ... 2,620 „ „ 2 ... 710 8,300	201	15	9	3	...	...	...	...	...	...	...	44	8	7	6	5	3	...	1	...	...	...	1	...	...	...	...	1	
5	From a point in the Sivok Jhora to the top of the main ridge of the Sivok Hills, thence down a long ridge between the Andari and Punderrh Jhoras to a point on the Ruyem Jhora, about 1 mile from its exit into the Teesta, 23,510 feet.	5,240	124	84	36		19	9			..	2	3	2	6	6	4	7	1	...	1	...	...	...	1	...	...	20	38	
6	From the same point on the Sivok river as No. 5, through level forest and the base of the hills to meet the Sivok river again, 2,000 feet.	2	...	4	2	...	...	...	...	...	...	...	2	6	9	5	8	9	...	...	...	...	...	...	...	...	...	1	1	
7	From where the Sivok river leaves the hills up a ridge meeting line No. 5, 4,420 feet.	1,680	72	65	42	16	13	6	3	1	...	...	2	3	2	8	5	2	...	...	...	...	...	...	...	...	...	3	7	
8	From the edge of the Sissu forest (survey 1872-73) Sivok river to meet line No. 5, 3,060 feet.	1,720	63	25	15	6	4	...	...	...	...	...	3	3	6	3	1	2	...	...	...	...	...	...	...	...	...	12	21	
9	Up the Golia Jhora from its entry into the Sivok river, main Jhora, and one small feeder. ft. Main Jhora ... ... 5,750 Branch 260 6,010	...	...	...	...	...	...	...	...	...	...	...	54	4	8	4	1	1	2	3	1	...	...	...	...	...	...	...	...	
10	From point on Sivok river opposite corner of survey 1872-73, up ridge to a peak connected with main ridge of Sivok Hills, 4,900 feet.	810	26	18	17	11	6	3	4	...	...	...	3	7	5	3	2	1	...	...	...	...	...	...	...	...	...	2	5	
11	From the junction of the Oongbong Jhora with the Teesta, to a point on ridge No. 1, 3,500 feet.	70	4	7	7	5	2	...	...	...	...	...	...	1	2	2	...	...	...	...	...	...	...	...	...	...	...	2	4	
12	From the Teesta river up the Oongbong Jhora, and a ridge between two branches to meet No. 1 line, 3,500 feet.	...	...	...	...	...	...	...	...	...	...	...	3	7	5	2	3	1	2	...	...	...	...	...	...	...	...	...	2	
13	From the point of junction of the Rungbheek Jhora with the Teesta, up the ridge to the Sivok leading to the main ridge of the Sivok Hills, and along the main ridge to a point on No. 5, 10,140 feet.	...	...	...	...	...	...	...	...	...	...	...	16	...	1	...	...	1	...	...	1	...	...	...	1	1	1	14	3	

REMARKS.

1. At first, steep ascent with dry forest of Terai trees, arriving on top of the ridge sâl forest, very dense but not many large trees, with a few saj, cheloni, &c., sâl better higher up; then got on to very steep knife-edge with sâl rather stunted—slope got steeper until at last further progress was impossible.

2. Passed first through grass Terai jungle, then the damp-loving vegetation of the deep vallies with India-rubber trees, pani saj, &c., a few toon and champ. The Jhora at last ended at the foot of a precipice.

3. Passed first through patches of alternate dry and moist Terai forest, then ascended the ridge through rather damp forest arriving at last at the sâl, which was good, though it evidently had been worked.

4. Forest much resembling that of No. 2, except that it was rather dryer.

5. At first through bamboo forest with saj, &c., then into sâl forest, rather dense; afterwards sâl rather stunted, with small bamboos; then a small patch of damper jungle, then the steep slope and top of the main ridge katoos and *Quercus Spicata*. Proceeding down met several India-rubber trees, under growth of *Livistona* palm—then a small patch of sâl, and afterwards dense damp creeper-jungle with toon to top of a peak. Then proceeding down to the Ruyem river, good toon and cheloni, a few saj and India-rubber trees, ending in more creeper-forest.

6. At first fine forest of large trees, principally saj, chalta, hattipaila, *Almus lanceafolia*, &c., then on the lower slopes bamboos, with saj and a few toon; saj, very good indeed, and fit for cutting, besides being easily accessible.

DIX V.

Area of lower hill forest 7,328 *acres,* (*total area of range,* 10,240).—*Season* 1873-74.

EASURED.

Cheloni.								Katoos.								Toon.										Champ.							India-rubber.		
III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	I.	II.	III.	IV.	V.	VI.	VII.			
Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Mature.	Seedlings.	Area of survey in acres.
32	23	10	6	2	...	...	...	147	31	10	5	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	2	...	...	...	...	...	...	1	17·05
...	...	...	...	...	...	...	...	32	7	5	6	1	...	...	...	...	11	...	1	1	...	...	...	...	...	...	3	...	...	1	...	1	...	7	3	15·16
28	20	10	3	1	1	...	...	122	14	7	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10·95
...	...	...	...	...	...	...	...	6	1	...	...	...	...	...	...	...	142	...	16	4	2	1	...	...	...	...	...	...	...	...	...	...	...	1	...	19·06
39	32	24	15	5	2	...	1	392	66	30	24	3	1	...	...	2	3	...	5	...	...	...	1	...	...	2	...	...	1	...	...	...	...	5	4	53·97
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4·59
9	10	1	...	...	...	...	...	5	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	16·15
16	13	4	3	...	...	...	...	52	4	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	7·02
...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	20	5	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13·79
6	2	1	...	...	...	...	...	4	...	2	...	...	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	11·25
2	2	1	...	...	...	...	...	51	7	6	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8·04
...	2	...	...	...	...	...	...	3	6	2	1	...	...	...	...	...	4	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8·04
3	...	1	...	...	...	...	...	20	3	2	...	1	...	...	1	...	8	3	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	15	3	23·05

REMARKS.

7. Slope more gentle than the parallel ridges. At first bamboo forest with saj, cheloni, then sâl forest, very good and of all ages to the point of junction with 5.
8. At first bamboo forest, crossed line 6 at 410 feet on top of ridge, sâl forest good.
9. Very winding course at first, damp forest of such places. Good Pani saj, on further, very steep sides, not much vegetation, many lamputtia, hattipaila, and a few ...
10. End in a precipice covered with *Phœnix* and *Wallichia* palms.
11. Very steep ridge in terraces, at first bamboo jungle as usual, then good sâl forest.
12. First up the side of the hill through a dense damp forest with chiefly big trees such as *Artocarpus, Chaplasha, Populus, Ciliata,* &c., on to the top of a ridge, then ... forest to the end, which is rather steep.
13. Very steep Jhora with occasional big pools, vegetation damp, dense. Many *Garcinias, Populus,* &c.; ridge exceeding steep, scrub, with grass, *Pandaum,* and ... palm.
14. At first through damp big-tree forest, then a few saj, then crossing a few streams India-rubber trees in good number. On top of main ridge a few toon and ... cheloni.

Number.	Position of Line of Survey.	Trees																												
		Sal.											Saj.																	
		I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	I.	II.
		Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Between 10-11 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Between 10-11 cubits.	Between 11-12 cubits.	Between 12-13 cubits.	Between 13-14 cubits.	Between 14-15 cubits.	Under 1 cubit.	Between 1-2 cubits.
14	Up the Rungbheek Jhora from its junction with the Teesta meeting No. 13, 5,000 feet.	...	...	...	...	...	...	...	...	...	...	...	57	3	5	3	4	1	1	2	...	1	1	...	...	...	...	8	
15	From a point on the Teesta close to the mouth of the Andari Jhora to top of ridge above Rungbheek Jhora, 4,300 feet.	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
16	Up the Andari Jhora from its junction with the Teesta. The line was stopped by a large pool with perpendicular sides, impossible to pass on foot, 1,800 feet.	...	...	...	...	...	...	...	...	...	...	...	4	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	
17	From a point on the Teesta a little south of Ruyem Jhora to ridge between Andari and Punderrh Jhoras meeting No. 5, 4,480 feet.	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1	...	...	...	...	1	...	...	...	...	...	...	...	
18	Up the Ruyem river from its junction with the Teesta, 11,100 feet.	...	...	...	...	...	...	..	...	...	...	...	424	11	4	5	6	2	1	...	1	...	1	1	2	...	...	1	
19	From the Ruyem river, along the Teesta valley road to Dridong Jhora, 6,400 feet.	9	20	12	5	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	15	
20	Up the Dridong or Seetikhola (P.) Jhora from its junction with the Teesta, 9,600 feet.	...	...	...	...	...	...	...	...	...	...	...	64	4	14	10	13	13	9	5	4	1	1	...	1	1	1	3	
21	From a point midway between Ruyem and Seetikhola Jhoras on the Teesta valley road along the Lepcha path to Kermott village, 6,900 feet.	...	...	...	1	5	1	1	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	6	
22	Down the second spur of the Kermott ridge, across the Lumbong Jhora and up the Lepcha path to Lumbong village; 6,300 feet.	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	1	2	
	Total ...	18,713	519	338	189	100	54	23	10	4	...	2	690	77	99	84	70	55	22	12	11	3	3	3	5	2	3	136	

REMARKS.

14. Very rocky, steep and slippery, pani saj and a few India-rubber with lamputtia trees, then damp forest with toon, katoos, &c.

15. First bamboo jungle with India-rubber trees, cheloni and katoos, on the ridge large katoos and *Quercus Spicata*.

16. Jhora very difficult to proceed along after crossing several pools with deep water and steep rocky sides, came to one impassible. A few saj and lamputtia, ro... covered with *Phœnix rupicola*.

17. Ridge very steep, with good toon, *Talanma Hodgsoni*, hattipaila katoos, plantains, canes, and large bamboos.

18. River broad, easy to ascend, many saj, a few India-rubber, *Engalhardtia* lamputtia, *Bassia latifolia*, *Am*, hattipaila and young toon. Banks in many pla... steep.

19. Through a level plateau of big bamboos, with a few sâl, many cheloni, katoos, toon, champ, with trees of Terai such as seeda, tatri, gambari, &c., afterwa... moist forest with a few India-rubber.

DIX V.—(*Continued.*)

MEASURED.

Cheloni.								Katoos.									Toon.										Champ.							India-rubber.		Area of survey in acres.
III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	I.	II.	III.	IV.	V.	VI.	VII.	Mature.	Seedlings.	
Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.	Between 7-8 cubits.	Between 8-9 cubits.	Between 9-10 cubits.	Under 1 cubit.	Between 1-2 cubits.	Between 2-3 cubits.	Between 3-4 cubits.	Between 4-5 cubits.	Between 5-6 cubits.	Between 6-7 cubits.			
2	2	...	...	...	...	...	...	6	1	...	...	...	...	...	...	1	6	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	4	11·47
2	1	3	4	...	...	...	...	54	7	13	4	4	2	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	2	2	9·88
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	4·13
3	3	7	6	3	...	...	...	11	2	1	2	...	...	...	...	1	...	...	3	4	4	6	1	...	...	1	...	...	...	...	...	...	...	1	2	10·29
...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	43	2	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	25·71
20	13	5	2	2	...	...	...	23	4	3	1	...	...	...	...	...	26	1	2	2	3	1	...	...	...	...	55	...	...	...	...	...	1	2	1	14·69
..	...	...	...	...	...	...	...	5	2	...	...	...	1	...	...	...	41	2	6	5	7	6	...	...	...	...	...	...	...	...	...	...	...	2	...	22·03
6	6	8	5	...	...	...	...	...	2	4	...	...	...	...	...	...	21	1	2	2	4	7	...	...	...	...	...	...	...	...	...	...	...	2	...	15·84
8	4	6	5	...	...	...	...	30	1	3	1	1	...	1	...	...	8	1	2	1	2	...	...	1	...	...	...	...	...	...	...	...	...	4	...	12·12
126	133	81	49	13	3	...	1	969	159	88	44	15	4	2	1	4	339	20	47	36	27	29	2	2	...	3	64	2	2	2	...	1	1	50	21	328·29

REMARKS.

20. At first damp forest, many lamputtia, *Garcinias*, Hattipalla, *Alnus Nepalensis*; higher up very good saj, many toon and India-rubber trees.

21. Passed first through the bamboo jungle on the small plateau with good toon, cheloni and some India-rubber trees, as well as trees of Terai. Then up a rocky path through a small patch of toon, &c., and a few sál. Then through a small patch of old 'Joom' cultivation to a small sál forest, after which all is under cultivation and the village is reached.

22. First ridge with bamboos, with toon, cheloni, &c., then damp forest with Engalhardtia, Garcinia, &c. Crossing the Jhora, a few large India-rubber trees with katoos and cheloni.

Note.—Saj contains 2 species ... { Saj *Terminalia tormentosa.* / Pani saj *Terminalia myriopteron.* | Katoos contains 2 species ... { *Castanea Indica.* / *Castanopsis Roxburghii.*

Contents of forest.

	Sál.	Saj.	Cheloni.	Katoos.	Toon.	Champ.	India-rubber.
Young trees, 2-3 cubits	7,544	2,209	4,129	1,964	1,049	44	Mature 1,116*
Trees, 3-4 cubits	4,218	1,874	2,968	982	803	44	Seedlings 468
Old trees, above 4 cubits	4,307	4,218	3,281	580	1,406	44	.....
Total	16,069	8,301	10,378	3,526	3,258	132	1,584

* I am inclined to think this over the truth, as the trees grow very locally, and many of the survey lines passed through these localities.

J. S. GAMBLE.

DARJEELING,
The 30th June 1874.

E. FUCHS,
Assistant Conservator of Forest.

APPENDIX VI.

FORM I.—*Statement showing the result of Forest Valuation Surveys in the Mooraghat Sâl forest.* Area of sâl tracts valued, 2,992 acres. (Total area of reserve, 7,680 acres.) Season 1872-73.

No.	Position of Survey.	TREES MEASURED. Sal. I. Under 1 cubit.	Sal. II. 1 to 2 cubits.	Sal. III. 2 to 3 cubits.	Sal. IV. 3 to 4 cubits.	Sal. V. 4 to 5 cubits.	Cheloni. I. Under 1 cubits.	Cheloni. II. 1 to 2 cubits.	Cheloni. III 2 to 3 cubits.	Cheloni. IV. 3 to 4 cubits.	Area of survey in acres.
1	The surveys are marked on the map by red lines with figures corresponding with the current numbers.	134	105	41	2	...	...	...	...	...	4·08
2		189	93	29	...	...	...	...	...	...	4·53
3		387	192	50	2	...	...	...	...	...	9·83
4		276	112	33	...	...	...	1	...	...	9·22
5		346	157	36	...	...	...	...	...	...	8·10
6		688	403	126	4	...	1	3	7	...	18·41
7		407	189	112	5	...	1	...	1	...	10·89
8		252	104	66	...	..	..	...	...	...	10·28
9		139	132	54	4	...	...	...	...	...	4·78
10		250	138	29	2	...	1	2	1	...	6·29
11		460	340	186	13	...	1	1	2	1	19·57
12		392	158	66	7	...	...	3	3	...	11·36
13		240	150	83	20	...	...	4	2	...	13·18
14		394	218	54	4	..	1	3	...	...	16·41
15		706	279	116	20	...	17	8	4	3	20·68
16		769	336	75	6	1	4	2	...	...	21·04
17		392	148	104	12	...	3	3	2	5	11·91
18		708	288	106	8	...	.	..	...	...	19·59
	Total ...	7,129	3,542	1,366	109	1	29	30	22	9	220·15
	Per acre ...	32	16	6·20	0·50	0·005	0·13	0·14	0·10	0·04	.....

Contents of Forests.

	Sâl.	Cheloni.
Seedlings	95,744	389
Saplings	47,872	419
Young trees	18,550	299
Trees	1,496	120
Old trees	15	.....
Total ...	1,63,677	1,227
Less seedlings and saplings ...	20,061	419

(Sd.) W. R. FISHER
and
W. JOHNSTON;
Asst. Commrs. of Forests, Bengal.

APPENDIX VII.

FORM I.—*Statement showing the results of Forest Valuation Surveys in the Dainah Sissu Forest.*
Area = 1,133 *acres*
Season = 1872 73.

No.	Position of survey.	TREES MEASURED. Sissu. I. Under 1 cubits.	Sissu. II. 1-2 cubits.	Sissu. III. 2-3 cubits.	Sissu. IV. 3-4 cubits.	Sissu. V. 4-5 cubits.	Sissu. VI. 5-6 cubits.	Area of survey in acre.
1	The surveys are marked in the map by red lines with figures corresponding with the current numbers.	8	47	29	6	3	.....	11·94
2		8	20	43	30	8	1	16·85
3		28	91	87	20	1	.....	25·15
	Total ...	44	158	159	56	12	1	53·94
	Per acre ...	0·80	2·93	2·95	1·04	0·22	0·019	.....

Contents of Forest.

	Sissu.
Seedlings	906
Saplings	3,317
Young trees	3,339
Trees	1,177
Old trees	271
Total ...	9,010
Less seedlings and saplings ...	4,787

(Sd.) W. R. FISHER
and
W. JOHNSTON,
Asst. Commrs. of Forests, Bengal.

APPENDIX VIII.

Statement showing the results of an examination of the concentric rings of 40 Sál trees in the Pantan reserve, Kamroop District, Assam.

No.	Average radius including sap-wood.	Average radius of heart wood.	Number of concentric rings on whole radius.	Heart wood only.	Number of concentric rings on radius including sap-wood. 0—2·860″	0—5·73″	0—8·6″	0—11·5″	Remarks.
				Trees grown on the hill.					
1	15·0	13·0	133	117	30	57	81	106	Sound.
2	12·5	11·2	129	113	37	61	89	127	Ditto.
3	11·8	10·5	138	116	36	64	98	133	Unsound at centre.
4	11·75	8·75	95	76	20	51	75	93	Ditto.
5	11·25	9·05	118	97	27	59	87	.....	Ditto.
6	11·	10·4	109	97	26	53	85	.....	Sound.
7	10·7	8·5	85	60	26	45	61	.....	Unsound at centre.
8	10·5	9·3	102	91	30	57	84	.....	Ditto.
9	10·5	9·1	109	96	31	57	87	.....	Sound.
10	10·3	8·7	113	92	33	65	91	.....	Ditto.
11	10·1	8·7	101	83	28	52	82	.....	Ditto, triangular.
12	10·	8·	81	65	26	49	69	.....	Ditto.
13	9·7	8·1	101	85	30	55	89	.....	Ditto.
14	9·5	·8	81	65	26	49	69	.....	Ditto.
15	9·3	7·8	97	78	29	56	87	.....	Unsound at centre.
16	9·	7·5	92	77	32	62	87	.....	Sound.
17	9·	7·6	101	82	35	58	85	.....	Ditto.
18	9·	7·5	79	64	27	57	76	.....	Ditto, very irregular.
19	8·8	6·3	75	55	24	50	73	.....	Ditto.
20	8·7	6·7	90	72	32	59	89	.....	Ditto.
21	8·6	7·3	85	70	30	57	85	.....	Ditto.
22	8·	·7	76	65	26	52	.....	.....	Ditto.
22	Total				650	1,225	1,720	459	
	Average				30	56	82	115	
				Trees grown in the plain.					
1	11·5	9·9	126	108	32	66	97	120	Unsound at centre.
2	9·5	8·5	99	83	30	59	87	.....	Sound.
3	9·2	7·8	99	79	32	62	89	.....	Ditto.
4	8·8	7·9	114	99	34	70	112	.....	Ditto.
5	8·4	7·2	95	75	28	59	.....	.....	Unsound.
6	8·3	6·7	96	71	29	60	.....	.....	Sound.
7	8·2	7·0	80	Unknown.	35	68	.....	.....	Ditto.
8	8·	6·5	78	63	24	54	.....	.....	Ditto.
9	8·	7·	108	90	32	60	.....	...	Ditto.
10	8·	6·6	112	92	42	83	.....	.....	Ditto.
11	7·9	6·4	79	59	26	55	.....	.....	Ditto.
12	7·9	6·4	98	78	36	72	.....	.....	Unsound at centre.
13	7·8	6·	86	60	30	61	.....	.....	Sound.
14	7·6	5·8	96	80	30	65	.....	.....	Ditto.
15	7·5	6·2	80	71	34	66	.....	.....	Ditto.
16	7·4	5·7	85	66	31	66	.....	.....	Ditto.
17	7·4	6·5	84	67	29	60	.....	.....	Ditto.
18	7·3	5·5	112	74	34	76	.....	.....	Ditto.
18	Total			.....	568	1,162	385	126	
	Average			.....	32	65	96	126	
40	Grand total			.....	1,218	2,387	2,114	585	
	Grand average			.....	30	60	86	117	

KULSI PLANTATION,
The 1st October 1873.

W. R. FISHER,
Assistant Conservator of Forests, Assam.

APPENDIX IX.

RECORD OF THE BAMUNPOKREE PLANTATION.

I.—General description of the Plantation Tract.

1st.—AREA OF TRACT IN ACRES.

a.—Area available for planting	1,300	0	0
b.—Area unfit for planting (the steep precipices—Pokri, river beds, &c.)	67	0	0
Total ..	1,367	0	0

2nd.—BOUNDARIES.—*North.*—Mount Perrier, forest land belonging to the Kurseong and Darjeeling Tea Company.

East.—The Rakti river, separating from Selim Tea Estate.

South.—The boundary of the Darjeeling Hill Tract, separating from Pelkados Jot belonging to the estate of the late Mr. C. Barnes, and Garidura rice land belonging to Mr. Spencer.

West.—The Bansamali river, separating from the Punkabari Tea Company's land

3*rd.*—Topographical Description.—The narrow hill at the northern extremity has very steep sides to the east and west, and slopes down gradually to the south for some distance. There is then an elevated plateau with a gentle slope to the south, bordered by steep slopes down to the two rivers on the east and west. At the southern extremity is the Pokri or tank, a marshy pool now filled up with very long grass without any trees. This gives rise to the Bamun Jhora which runs first east, and then south to meet the Bansamali river.

The upper plateau terminates below the Pokri, in a steep hill leading down to the lower plateau, a gentle slope terminating in the Terai itself. The accompanying section will give a tolerable idea of the general lie of the land. On the western portion of the south boundary there is a precipitious ridge from the Bansamali river to the Bamun Jhora, and the banks of the Rakti river are also precipitious Thus the land may generally be described as consisting of two plateaus connected by a steep ridge, which on the east and west runs down to the boundary line. Above the upper plateau rises a steep hill running up to 2,000 feet altitude.

4*th.*—Geological description.—*Strata.*—Tertiary sands, and sandy clays.

Sub-soil.—Very deep, and lower plateau gravel and sand; on the section at the Rakti river fully 50 feet of homogeneous soil may be seen.

Soil.—Sandy loam with a very large admixture of 'Humus.' The upper plateau predominates in 'clay,' the lower in 'sand.'

5*th.*—Climate.—

a.—Average rain-fall ..	.. 150 inches.
b.—Annual mean temperature ..	.. About 75° but cannot be told till a proper record has been kept.
c.—Annual mean temperature of coldest month 65°	.. Mean of January and February, for which months record was kept at plantation, morning, noon, and evening.
d.—Highest temperature ..	.. About 95°
e.—Lowest „ ..	.. 50° lowest at 8 A.M. Probably 48 at sun-rise.
f.—Prevailing winds ..	.. W. and S. W.

The average rain-fall is that of Selim hill above Bamunpokree, communicated by Mr. Southby; it should be, if anything, rather less than this. It would be well worth while to put up a rain-gauge.

6*th.*—Vegetation.—The Hill to the north is covered with fine *sâl* and *cheloni*; the upper plateau with a very fine thickly grown forest, chiefly consisting of old *cheloni*, with *sida*, *kumbi*, *tatri*, a few *saj* and other trees of the following list:—

Cheloni	*Schima Wallichi*, old and big trees.
Saj	*Terminalia glabra (tomentosa)* a few chiefly of large size.
Seeda	*Lagerstroemia parviflora*, of very large size.
Tatri	*Dillenia Pentagyna*, big.
Koombi	*Careya arborea*, big.
Jamun	*Eugenia Jambolana.*
Amultas	*Cassia fistula*
Dudhali	*Holarrhena antidysenterica.*
Dudhkuri ..	„ *pubescens.*
Ateapali	*Wrightia mollissimo.*
Udal	*Sterculia villosa*, big.
Harra	*Terminalia chebula.*
Bahura	„ *Belerica.*
Dubdubbi ..	*Garuga pinnata.*
Simul	*Bombax Malabaricum*,
Toon	*Cedrela Toona* (very few.)

and many others.

The undergrowth is slight, chiefly consisting of creepers, such as *Bauhinia vahlii*, *Spatholobus setaceus*, and *Dalbergia stipulata*, with a large coop of *Leea staphylea*, and *Leea robusta*, which die down in the cold weather. The slopes towards the east and west are chiefly covered with big bamboos, with the same species of trees as on the plateau; while in the valleys themselves we find *Terminalia myriopteron*, a huge tree; *Actinodaphne oboratum*, *Phœbe lanceolata* and other laurels; a few toon; *Dysoxylon*, two or three *sp*; and canes, chiefly *Calamus schizospathus*, and *leptospadix.*

The southern slope, between the upper and lower plateau, has evidently been formerly 'joomed' by Mechis; it is now covered with sâl forest, chiefly stump-shoots and trees of small size, though well grown with seeda, mahow, (*Kydia calycina*), "khair" (*Acacia ferruginea*),

Tatri, Koombi, Bahura, *Bhaila*, &c., with many wild plantains and long grasses, such as *Saccharum spontaneum*, *Apluda sp.*, *Antistheria arundinacea*; *Erianthus sp.*, and the fine bushy-growing tough-stemmed *Pogonanthera crinita*.

The lower plateau is young sâl forest, with many *Acacias* and *Albizzias* such as khair (*Acacia catechu*); khaur, (*Acacia ferruginea*); kunkur, (*Albizzia odoratissima*); kala siriss, (*Albizzia sirissa*); safed siriss, (*Albizzia Elata*); we also find sitsal, (*Dalbergia latifolia*) pretty common; and simul, koombi, tatri, taki, (*Bauhinia variegata*); koirahlo, (*B. malabarica*); goehlo, (*Callicarpa arborea*); harra, Bahura, mahow, bhayla (*Semecarpus anacardium*), with a few *Glochidion thomsoni*, *Elæodendron Roxburghii*, *Nauclea cordifolia*, &c., &c. The undergrowth consists chiefly of long grasses; *Antisthyria arundinacea*, *Androscepia gigantea*, *Saccharum spontaneum* *Apluda mitrea*, *Thysanoloena cymbopogon*, *Imperata arundinacea* with the thorny *Mimosa rubicantis*, *Clerodendron serratum*. *Buddleia*, *Desmodium sp.*; &c. It would probably be difficult to find a piece of land in the Darjeeling district as well bounded and defined which would give as good examples, not only of nearly the whole vegetation of the Terai and lower hills, but of the different classes of forest and their characters. A great part of the lower plateau and southern slopes above it was, until taken up for plantation in 1868, regularly cultivated by Mechis. This is abundantly seen by such traces as the castor-oil plant, which has been very difficult to eradicate in the nurseries; *edible cucurbitaceæ*, an occasional small jack or mango tree; and a few fleshy *Euphorbias*, which the Mechis are very fond of planting near their houses.

7th. Timber Markets.—(1) *for export.* Silligori, about 13 miles distant at the junction of the Balasun and Mahanuddy rivers, can be reached either by road or by river. By the latter course the timber would be floated with the assistance of elephants, about 14 miles by the Rakti and Balasun rivers; then the country through which the Mahanuddy runs, down to the Ganges.

(2.) *For local use.*—Chiefly for the surrounding tea plantations, where the requirements are—

(1.) *Building timber.*—Sâl, cheloni, saj, sissu, champ.

(2.) *Tea boxes.*—Toon, Goguldhup (*Canarium bengalense*), Mahua (*Engelhardtia spicata*), Lamputtia (*Duabanga sonneratioides*), but most especially the first which is always used, if procurable, in preference to any other wood.

(3.) *Charcoal.*—Hard wood such as sâl, saj, sissu, kunkur, &c.

(4.) *Fire-wood.*—Any species, but the harder and dryer the better.

(5.) *Bamboos.*—For all purposes. Abundant on the lower plateau.

(6.) *Thatch grass.*—

As far as concerns Bamunpokree, there might be supplied—

(1.) *Sâl.*—A few large trees on the northern hills.

Cheloni.—A supply for many years on the upper plateau, more than sufficient for present demand.

Sissu.—Can be supplied from the neighbouring Government Forests of Rakti and Balasun.

Champ.—Much used for planking, can be procured from the Upper Hill forests (*Michelia excelsa*), or from the Lower Hills about the Mahanuddy River (*Michelia champaca*), would be worth planting.

2nd.—Toon.—The enormous demand for this wood is very far from being satisfied; the present plantations may, in the future, to a certain extent, meet the demand as far as regards the tea plantations in the immediate vicinity. The other woods may be obtained from the forests along the Lower Hills but they are, none of them, to be found in any very great quantity.

3rd, 4th.—This is chiefly supplied from the timber on the tea plantations themselves. The Bamunpokree forest and those surrounding it could supply a great deal, especially from the material taken out on the formation of plantations. Judging from appearance, there seems to be no doubt that most of the surrounding tea concerns will run out of timber and fire-wood within a short time.

5th.—There is a large supply on the Eastern and Western slopes.

6th.—A very large supply in the plantations.

The timber, &c., sold from Bamunpokree in 1873-74 was—

			Rs.	A.	P.	
Sâl ...	...	10 trees ...	100	0	0	
Cheloni ...	...	5 „ ...	52	0	0	
Toon ...	...	6 „ ...	72	0	0	
Bamboos ...	...	4,300 „ ...	43	0	0	
Canes ...	...	... ...	8	0	0	
Thatch grass ...	...	... ...	44	3	3	
Grazing fees ...	...	... ...	0	8	0	(now not allowed.)
		Total revenue ...	319	11	3	

Estimated amount required per annum.—There will be a ready sale for all the material that can possibly be grown on the area.

Price of materials.

	Present.	Prospective for the next future.
Sal	1 Re. per cubic foot in log 10 Rs. per standing tree	Rs. 15
Saj	10 „	„ 10
Cheloni	10 „	„ 10
Toon	15 „	„ 20
Sissu	10 „	„ 10
Sitsal	12 „	„ 10
Goguldeep ...	10 „	„ 10
Others	6 „	„ 5
Bamboos... ...	1 Re. per 100	„ 2 per 100
Canes	4 Rs. per monthly ticket	„ 4 per 100
Grass	2 pie per load	2 pie per load.

But even these rates will have to be very much raised in the future as the terai is cleared, railways and roads made, and tea cultivation extended.

8*th.*—*Lines of export.*—(1.) Road from Pankabari to Silligori, passes close to the southern boundary. (2.) Rakti, Balasun, and Mahanuddy to the Ganges.

9*th.*—*Labor available.*—(1.) Paharias, coolies employed on tea estates come generally from the Nepal 'morung.' Dangos, from Sonthal Pergunnahs and Chota-Nagpore generally on special contract as tea plantation coolies. Bhooteas very rarely met in the terai.

Price of labor.

	A.	P.	
On the plantation the coolies are paid per day ...	3	6	per man.
Ditto ditto ditto ...	3	0	„ woman.
Ditto ditto ditto ...	2	6	„ child.

On the surrounding tea plantations the rates are Rs. 5-6-7, and even occasionally Rs. 8 (for superior work such as tea-making) per month, less Sundays or hat-days; each month, therefore, contains 25, 26, or 27 days, the daily rates being consequently annas 3-1, 3-8, 4-3, 4-11, respectively.

10*th.*—The map of the plantation is appended; scale 4 inches = 1 mile,

II.—General plan of operations.

1*st.*—*Formation of compartments and blocks.* The forest has been divided into five blocks for planting, as follows:—

Blocks I *and* II, on the lower plateau respectively east and west of the Bamun Jhora. It is impossible to make them of regular shape or the roads very regular, as some parts, especially of I, have already been planted and in irregular areas. A new disposition of the roads will allow of tolerably regular compartments being made. The base line will be that from the foresters house to the Rakti river. It will be crossed at right angle by a long road extending right up the plantation. This will be crossed again by another road, parallel to the base line, making six compartments to block I. Of these, compartment one, about half of two, and a portion of three have already been planted. The same base line prolonged westwards will give a base for laying out block II, which will then be divided into three compartments necessarily of irregular shape.

Blocks III, IV, *and* V, are formed out of the hill portion of the forest. Block III comprises a part of the upper plateau with the slopes to the south; block IV, the greater part of the upper plateau with the slopes on either side to the east and west; block V, the upper hill and its slopes. The arrangement of the compartments in these blocks may be left for future consideration. In block III, an area of six acres has been planted with teak and toon alternately.

In block I, compartment *i* is sub-divided into two sub-compartments *a* and *b*; compartment two into three, sub-compartments *a*, *b*, and *c*; and compartment three into two, namely *a* and *b*. Except in compartment one, the sub-compartments will disappear after a few years

2*nd.*—*Area to be planted per year, and succession according to which the several compartments are to be planted.*—The area to be planted per year will depend on the size of the compartments, and it will vary from 30 and 50 acres; and if two compartments are planted in one year, from 60 and 100 acres.

Succession.	Compartments.	Area. A.	R.	P.
In 1875	I. 2. *c.*	19	1	0
Ditto	I. 3. *b.*	25	0	0
Total ...		44	1	0

Succession.	Compartments.	Area. A.	R.	P.
In 1876	... I. 4.	42	1	0
Ditto	... II. 1. *b.*	10	0	0
	Total ...	52	1	0
In 1877	... I. 5.	32	2	0
Ditto	... I. 6.	25	0	0
	Total ...	57	2	0
In 1878	... II. 2.	42	1	0
In 1879	... II. 3.	67	3	0

The rest may be left for future consideration.

If it be found practicable, however, the allotments of two years might be planted in one year, more or less, according to circumstances.

3rd.—Enumeration of trees to be planted.—Blocks I, II, and III, to be planted with teak and toon, and perhaps mahogany.

Bocks IV, and V, to be planted with toon, by cutting out useless trees and planting toon seedlings instead.

Description of method to be followed; Blocks I, II, and III.—Lines to be laid out 5 feet apart, and tallies made 5 feet apart in these, 1,742 tallies per acre.

Teak to be planted in every third tally of every line thus:—

+	0	0	+	0	0	+	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
+	0	0	+	0	0	+	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

In this way there will be per acre—

Teak	193
Toon	1,549
Total	1,742

Seedlings to be raised in irrigated nursery beds early in the year, and transplanted during the year in the months of June and July, if possible. The toon seedlings to be always carefully shaded from the sun at first by thatch.

4th.—Estimated cost per acre during first three years.

(*a.*) *Purchase of land*—None.

(*b.*) *Working charges.*

	Rs.	A.	P.	Rs.	A.	P.
First years.—Cutting jungles—20 women at three annas each, doing 15 tans per day, will do one acre; cost ...	.....			3	12	0
First hoeing—30 men at three annas six pie each, doing 10 tan per day, will do one acre	6	9	0	.....		
Second hoeing—17 men at three annas six pie each, doing 18 tan per day, will do one acre ...	3	11	6			
Third hoeing—12 men at three annas six pie each, doing 25 tan per day, will do one acre	2	10	0	12	14	6
Transplanting—One acre holds 1,742 plants, each man doing say 150 plants per day or 12 per acre ...	.....			2	10	0
Nursery work, half an acre.						
Share per acre—Hoeing, 15 men at 10 tan per day Rs. 3-4-6; weeding, smoothing, and making beds, 30 men at 5 tan per day, Rs. 6-9, or per acre of plantation	0	5	3			
Seeds	1	4	0			
Tools	1	12	0			
Sowing, &c.	1	5	0	4	10	3
Total first year ...	.....			23	14	9
Second year.—Three *hoeings* at 25 tan, Rs. 2-10 each ...	.....			7	14	0
Transplanting.—Filling vacancies second year estimating 25 per cent. 435 plants, 3 men at three annas six pie	.....			0	10	6
Total second year ...	.....			8	8	6

	Rs. A. P.	Rs. A. P.
Third year.—One *hoeing* at 25 tan	.....	2 10 0
Transplanting.—10 per cent. vacancies 175 plants, 1¼ men at three annas six pie	.....	0 4 4
Total third year ...	.....	2 14 4
Total for first three years ...	.....	35 5 7

In round figures:—

First year	.....	25 0 0
Second year	.....	10 0 0
Third year	.....	3 0 0
Incidental expenditure	.....	2 0 0
Total ...	.....	40 0 0

(*c.*) *Establishment.*

One forester	.....	30 0 0
Two watchers at Rs. 8	.....	16 0 0
Per month ...	.....	46 0 0

or Rs. 552 per year.

As the forester will have charge of the Bamunpokree forest, Rs. 500 only should be put down against the plantation. If 50 acres are planted per year, the share per acre would be Rs. 10, and therefore—

Working charges	.....	40 0 0
Establishment	.....	10 0 0
Total per acre ...	.....	50 0 0

for the first three years.

J. S. GAMBLE, B.A.,
Assistant Conservator of Forests, Cooch Behar Division.

DARJEELING,
The 1st September 1874.

W. SCHLICH,
Conservator of Forests, Bengal.

RESOLUTION.

AGRICULTURAL DEPARTMENT.

FORESTS.

Calcutta, the 21st January 1875.

READ—

The Progress Report of the Forest Administration of Bengal for the year 1873-74.

THE formation of Assam, including the districts of Goalpara, Cachar, and Sylhet, into an independent administration, having relieved the Government of Bengal of the charge of those territories, the present is the last report that will deal with the management of the forests of that province. The work of the Bengal Forest Department relates to the charge of the forests of the Cooch Behar and Chittagong Divisions. Steps have also been taken to bring a very extensive tract of forest land, 178 square miles, in the Palamow sub-district of the Chota Nagpore Division, under management. Also the forests of the Soonderbuns will probably be made over to the administration of the Conservator.

Inspection.

The forest tracts of Bengal have as yet been inspected to so small an extent, that it will be some years before the "reserves," which it may be found desirable to take under State management, can possibly be determined. The work is meanwhile progressing steadily, if slowly; and the Lieutenant-Governor is glad to observe that it has been arranged between the Deputy Commissioner of the Cooch Behar district and the Conservator of Forests, that the sâl tracts on the slopes east of the Teesta, which it has been intended for the last eight years to reserve, should be definitely marked off during the present cold season. The Lieutenant-Governor trusts that this promise will be fulfilled, the more so as Dr. Schlich reports that joom cultivation has so rapidly increased of late years in parts of this district, that no time should be lost in rescuing the forest from the destruction that will otherwise overtake it.

The examination of the Soonderbuns, which was commenced in 1872-73, was completed in the year under notice by Mr. A. L. Home; the tracts examined by that officer covering an area of nearly 1,100 square miles in the Jessore district. The Soonderbun forests are situated on the almost numberless islands that lie within the tidal waters of the Bay. Their general level being but from 1 to 2 feet above high-water mark, the forests are inundated at spring tide only. The main rivers that flow through this low lying delta are connected by creeks that form the islands on which the forests grow. The soil is composed of sand and decaying vegetation; the climate pleasant from November to March; but the whole tract is very unhealthy at all times. The forests are closed during the monsoon, owing to the danger of the navigation, and would yield nothing but firewood, but that upon piercing the outer edge of the islands they are found to be covered with a valuable and quick-growing timber known as sundri, of which the supply appears to be inexhaustible. The sundri is estimated, it seems, to attain its full growth in 25 to 30 years. The trees grow up very close together to a height of 40 to 50 feet, with a straight bole of 18 to 30, and occasionally 35 feet, without a branch, and with a girth from 4½ to 6½ feet. The forests are extensively worked for firewood and timber by native boatmen, who carry the produce of their cuttings to numerous markets in the districts of Backergunge, Jessore, and the 24-Pergunnahs, where the timber is bought up

by the mahajuns mainly for boat-building, the craft finding their way eventually to Calcutta. The question of deriving a revenue from these forests is beset with special difficulties. The subject is under consideration, however, but the final decision of Government will be postponed until the Conservator himself has inspected the tract in the present cold season. A trial is meanwhile being made of the sundri timber for railway sleepers on the North Bengal Railway, now under construction.

In Chittagong, the Assistant Conservator has inspected a fresh tract of forest on the Naaf, in the extreme south of the Division, where a very active trade in boat-building is carried on; but the Commissioner of the Division thinks that the proposals that have been made in connection with this inspection should stand over for the present, pending the proposed transfer of the Cox's Bazar sub-division to Arracan; and the Lieutenant-Governor approves of this suggestion. The Assistant Conservator has not attempted any inspection of the forests in the Lushai or Fenny country during the year, for fear of complications with the tribes; and in view of the Deputy Commissioner's report, that no trade in timber can reasonably be looked for therewith, His Honor directs that such inspection should be foregone for the present.

Reserves.

In Assam, 429 square miles of forest in the Eastern Dooars were declared "open forests" during the year. The general character of these forests was briefly described in the Government Resolution of 31st March last on the Forest Report of 1872-73; and paragraphs 30 to 39 of the present report furnish much interesting information concerning them, which more immediately interests, however, the administration of Assam. The same remark applies to the valuable and extensive forests described by Dr. Schlich (paragraphs 41 to 49) on the Garo Hills, and in the other districts of Assam referred to in paragraphs 51 to 56.

The Lieutenant-Governor is glad to observe that steady progress has been made during the year in the formation of "reserves" in the Cooch Behar Division. The first steps in this direction were the surveying and mapping of the Mahanuddy terai range, to ascertain its probable yield of sâl, khair, and sissu timber; while an inspection of the Sivok Hill Tract has shown the existence of extensive slopes covered with a luxuriant growth of valuable and mature timber of several kinds. The Conservator remarks that the *Ficus Elastica* grows perhaps more luxuriantly in this tract than in any other part of the Darjeeling district; and if plantations of rubber are to be formed in Cooch Behar, the Sivok lower range should, it would seem, be chosen as their site. In the Western Dooars (Julpigoree), the *Muraghat sâl forest*, 12 square miles in extent, and the *Dainah sissu forest*, of nearly two, were declared reserved forests during the year; and in addition to these reserves, the *Buxa plain forest*, with an area of 158 square miles, of which about one-half is covered with sâl, was examined and mapped during the year. The two former tracts will require five to ten years' rest, and in the meantime must be protected from fire, cutting, grazing, and cultivation. The Buxa forest, on the other hand, is found capable of at once yielding 5,000 sâl trees a year—an outturn that may, it is affirmed, be doubled and trebled under proper conservancy in future years. Arrangements have been made for working this forest at once, and sanction has been accorded, since the present report was received, for the purchase of elephants for the purpose.

The Lieutenant-Governor is glad to observe that the Palamow forests, comprising an area of 178 square miles, as already noticed, are to be brought under management. The necessary establishment has been sanctioned for the purpose, and the reserves will, it is hoped, be demarcated during the present cold season.

In the Chittagong Division, it is not yet decided whether reserves should be formed or not, some difficulties attending the question of their formation. The Conservator of Forests is to visit the Chittagong Division during the present

season, and the Lieutenant-Governor defers the expression of any opinion upon the subject until Dr. Schlich's report is in his hands, the submission of which, he trusts, will not be delayed. The question of forest rules for this division is in the meantime also in abeyance.

His Honor notices with satisfaction Dr. Schlich's statement that in the course of another year or two measures for the protection and management of all the "reserves" above described will be in full working order, under the re-organization and enlargement of the establishments recently sanctioned by the Government of India.

Plantations.

In the way of plantations, the chief efforts of the department have been directed hitherto to the propagation of teak and India-rubber. Dr. Schlich asserts that we have been attempting to grow the former in cold and damp climates beyond the natural limits of its growth, and the latter in a manner different from that of nature; the result being that much money has been spent with very poor results. The question of the growth of rubber is practically transferred to the administration of Assam, as it is in the districts of that province that the *caoutchouc* tracts chiefly lie. Concerning the growth of teak, Dr. Schlich appears to be of the opinion that while the tree may be grown all over Bengal, it is doubtful whether the hope of obtaining fine teak even from the Sikkim Terai is well founded; and as to Upper Assam, he questions whether teak will thrive there at all. The last year has brought the department, he says, some new and discouraging experiences with reference to teak, in the appearance of a borer on the Kulsi plantations, and the total failure of the Burmah seed sown at Bamunpokree even to germinate. The experiment is of too much moment to be lightly abandoned, and must be persevered with under such changes as the Conservator deems necessary. Plantations of *toon*, it is satisfactory to note, are meanwhile reported to spring up like grass, and the young trees to stand transplanting well.

Dr. Schlich's report contains some interesting remarks (paragraphs 154 to 157) on the general question of the growth of rubber; but as His Honor has recently reviewed the subject in Resolution of 17th June 1874, he will not discuss it here.

A more important matter, in so far as Bengal is concerned, is the now acknowledged fact that mahogany grows well in the Bengal plains. Dr. Schlich tells us that during the rains of 1873 some seedlings were planted at Bamunpokree which grew very little during that year, but have made a wonderful start since the rains of the present season set in. The Lieutenant-Governor attaches much importance to the adoption of adequate measures for extending the growth of this valuable timber in the province, and commends the question to the Conservator's special attention. Mahogany, it is true, is a somewhat slow-growing tree, and we must be content to sow the seeds of a harvest to be reaped two generations hence.

Yield.

Concerning the yield of the forests in the Cooch Behar Division, the Conservator remarks that owing to large quantities of timber having been felled in former years and left lying in the forest, although shown in the books as lying in so-called depôts, the department is still occupied with the sale and clearance of these old cuttings, at prices generally much below the rates at which they are entered in the stock accounts. In Chittagong, the yield of the year was 2,759 tons of timber, against 2,164 tons in 1872-73 and 1,518 tons in 1871-72. A doubt is expressed, however, as to whether this increase is matter of congratulation or not; the increase consisting mainly of timber converted by scooping into dug-outs, causing, it is asserted, a wasteful expenditure of forest. His Honor has no doubt that the question will receive Dr. Schlich's attention on his visit to the district.

Revenue.

The revenue and expenditure of the year having been already reviewed by His Honor in Resolution of 17th November 1874, on the forest estimates of the year, it is sufficient simply to remark in this place that the total revenue of the year 1873-74 amounted to Rs. 1,79,366, against an expenditure of Rs. 1,37,498. The figures, of course, show that this important department is as yet in its infancy; but the Lieutenant-Governor is glad to recognise the earnestness of purpose and the great professional skill with which it is superintended by Dr. Schlich and Mr. Mann (Assam), to whom, and to the general staff of the department, the thanks of the Government are due for their labours in the past year.

By order of the Lieutenant-Governor of Bengal,

R. KNIGHT,

Asst. Secy. to the Govt. of Bengal.

No. 214.

COPY forwarded to the Conservator of Forests for information.

No. 215.

COPY, with 350 copies of the report, submitted to the Secretary to the Government of India, in the Department of Revenue, Agriculture, and Commerce.

No. 216.

COPY, with copy of the report, forwarded to the Secretary to the Chief Commissioner of Assam; to the Commissioners of Cooch Behar, Chittagong, Chota Nagpore, Bhagulpore, Dacca, and the Presidency Divisions; also to the Collector or Deputy Commissioner of each district of the Cooch Behar, Chota Nagpore, and Chittagong Divisions, and of the Sonthal Pergunnahs.

By order of the Lieutenant-Governor of Bengal,

R. KNIGHT,

Asst. Secy. to the Govt. of Bengal.

CALCUTTA,
The 21st January 1875.

PROGRESS REPORT

OF

FOREST ADMINISTRATION

IN THE

LOWER PROVINCES OF BENGAL

FOR THE YEAR

1874-75.

BY

W. SCHLICH, Ph.D.,

Conservator of Forests, Bengal.

Calcutta:

PRINTED AT THE BENGAL SECRETARIAT PRESS.

1875.

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APPENDICES.

Appendix I.—List of the more conspicuous trees observed in the *Chittagong Forests*, by Dr. W. Schlich, Conservator of Forests, Bengal, during a short visit in January and February 1875.

„ II.—Statement showing the results of Forest valuation surveys in the Buxa Plain Reserve.

„ III.—Working plan of the *Buxa Reserve* for the years 1875-76 to 1882-83, or list of compartments to be worked annually in Block III, Rajabhatkaua.

No. 34, dated Calcutta, the 9th August 1875.

From—Dr. W. Schlich, Conservator of Forests, Bengal,

To—The Secretary to the Government of Bengal, Financial Department.

I have the honor to submit the annual administration report of the Forest Department for the year 1874-75, together with a map of the Buxa reserve, on a small scale, which illustrates the provisions of the working plan of that reserve for the years 1875-76 to 1882-83, as described in paragraph 68 of the report.

2. I beg that 20 copies of the report may be forwarded to me as soon as it has been printed, so that the officers of the Department may receive copies before the commencement of the next working season.

PROGRESS REPORT

OF

FOREST ADMINISTRATION IN BENGAL

For the Year 1874-75.

By W. SCHLICH, Ph.D.,

Conservator of Forests, Bengal.

INTRODUCTORY.

The year 1874-75 has no doubt been the most eventful to the Bengal Forest Department since its formation. The work of foremost importance in Indian forestry is the selection and formation of the State forests. During the first eight years of the Department's existence in Bengal, very little was achieved in this respect, so that at the end of 1871-72 the total area of State or reserved forests amounted to 106 square miles, all situated in the Darjeeling district, west of the river Teesta. When the present Conservator assumed charge of the Department in 1872, he set at once to work to collect and arrange the data upon which the selection and formation of the State forests in Bengal might be based. A large amount of such information has been recorded in the annual reports for 1872-73 and 1873-74, and an additional amount of similar information will be found in this report. During the two first-named years, however, the formation itself of the State forests did not make much progress; and it was only during the year under review, when His Honor the Lieutenant-Governor, relieved from the cares of the famine, took the matter up, that rapid progress has been made, and so much so that the area rose from 120 square miles at the beginning of the year to 1,467 square miles at its end. Moreover, since the close of the year 223 square miles more have been gazetted, bringing the total area up to 1,690 square miles. In addition 1,200 square miles are now under discussion, so that at the end of another year the area of our reserves will not be much short of 3,000 square miles, or far more than those under any other administration in the Bengal Presidency.

2. At the beginning of the year the Department had been reduced to two forest divisions, Cooch Behar and Chittagong, owing to the separation of Assam. At the end of the year we had five divisions, Darjeeling, Julpigoree, Palamow, Sunderbun, and Chittagong, and two more are now under consideration, Sarunda and Sonthal Pergunnahs.

3. Financially the Department shows signs of satisfactory improvement. As compared with 1873-74, the revenue shows an increase of Rs. 58,129, or 50 per cent., and the surplus an increase of Rs. 44,963, or 144 per cent.

4. The above data will prove that we are in a fair way of progress, but what is now urgently required is a considerably increased staff of superior and subordinate officers to cope with the enlarged work. Appropriate proposals are before Government, and it is hoped that they will receive early sanction,

so as to enable the Conservator to bring the several divisions into proper working order, and to bestow that care upon the State forests which true forestry demands from us.

SECTION I.—INSPECTION OF FORESTS.

5. This section contained a large quantity of information in the last two annual reports, but it will become more and more reduced in size as the general examination of the forests draws to an end; whereas the next section, treating of the reserves, will grow in extent and importance.

DARJEELING DIVISION.

DUMSONG.

6. Mr. Gamble examined during the year a great portion of the Dumsong sub-district, preparatory to the selection of the reserves. The following extract from his report gives a clear idea of the country and its vegetation :—

"The extreme highest point is Rechi La (over 10,000 feet) in the north portion. From this runs to the south a spur to a point called 'Pankasarry,' 8,112 feet, which there spreads out in different directions, and forms the hill country between the Teesta river and the Narchu. To the south-east runs another spur, whose ramifications form the country between the Narchu and the Jaldaka river; to the north-west also runs a spur, named Rhenock, which however very soon becomes the territory of independent Sikkim.

7. "The geology of the Dumsong territory much resembles that of Darjeeling. The upper hills are formed of gneiss, which, in a line running from the Rushett river, past Dumsong and Kalimpoong, through Sikhbor to Dalingkote, and to the mouth of the Rango Chu, changes into slaty schists and quartzites (called by Mr. Mallet the Daling series). This series is between the Lebti and the Murti rivers, the formation of the lower hills, there being a gap in the tertiaries, which so constantly fringe the base of the Himalayas, and which are the formation between the Teesta river and the Lebti, and again between the Murti and Jaldaka. Towards the Jaldaka river the so-called Buxa series of slates and dolomite occurs, this being its only appearance in the Darjeeling district. There are two important mines in this territory, both of which I have visited, viz. the copper-mine in the Teesta valley and the iron olive at Sikhbar on the Rere-Oong, an affluent of the Rilli river. The soil over the whole of the territory of Dumsong appears good, and specially so in the Teesta and Rilli valleys.

8. "The chief rivers are—

No. 1. The Teesta, with its upper tributaries—the Rangpo, Rushett, Mayrong.
No. 2. The Rilli, a tributary of the Teesta.
Nos. 3 to 5. The Lish, Ramthi, and Ghish (or Jutchu) rivers, flowing from the Sumthar ridge towards the plains.
Nos. 6 to 8. The Chel (Chichu), Mal (Suckamchu), and Neora (Narchu), flowing southward from the central ridge.
Nos. 9-10. The Murti (Mochu) and Jaldaka (Dochu), with the affluents of the latter, the Chulung Chu, Rango Chu, and Machu, flow southwards from the eastern hills.

Of these are floatable:—At all seasons; Teesta.
In the rains; Rilli, Jaldaka.
Probably floatable with the help of elephants in the rains:—
Lish, Ghish, Chel, Neori, and Murti.

9. "The principal inhabited parts are the valleys of the Teesta and Rilli, especially the latter; the cultivation is old, and consists principally of wheat, barley, mustard, and maize; root-crops seem unknown. The cultivators are Sikkim Bhuteas in the older portions, and chiefly Nepalese in the newly-

cleared land. The former have comfortable, well-built houses, make paths, fence in their cultivation, and grow fruit-trees, chiefly plantains, peaches, mulberries, a few oranges and guavas, limes, and in the hotter parts of the valleys the mango and jack-fruit. They plant the strong plain bamboos (probably *Bambusa Balcooa*,) and grow trees, especially the Chilauni (*Schima Wallichii*), about their cultivation, giving a very pretty appearance to the country.

10. "In some places trees are growing in the cultivations, which are always allowed after a few years' crop to lie fallow for a time. Then, when the turn comes round for the fallow land to be again cultivated, the trees are pollarded, and the leaves and branches burnt with the jungle which has grown up in the cultivations, and which chiefly consists of *Artemisia Indica*, *Rubus flavus*, *Buddleia neemda*, and young trees of different kinds. The chief trees thus used are *Schima Wallichii*, *Engelhardtia spicata*, *Castanopsis Indica*, and *tribuloides*, *Quercus spicata*, and *Eurya Japonica*.

11. "In the south-west part of the district, between the Rilli and the plains, are the chief lands still cultivated by Lepchas, and most of these are only lately refugees from the Darjeeling Hills, driven out by the increasing spread of tea cultivation and by the prohibition against clearing fresh land for cultivation.

12. "There are also a few villages in the Jaldaka valley, but with these exceptions the whole of the south and east of the sub-division is a vast forest, inhabited only by wandering cattle-grazers, who take their cattle into the lower valleys during the cold weather, retiring at the end of March to the summits of the ridges.

13. "Of roads there is, properly speaking, only one, viz. that from Darjeeling across the Teesta, through Kalimpung and Laba to Ambiokh, and thence to Julpigoree by Kyranti hât, and its short branch from Paicugung to Dumsong.

14. "Ghâts across the Teesta from the Darjeeling Hills:—

No. 1.—Teesta ghât, under Kalimpung.
No. 2.—Rilli ghât, at the junction of the rivers Reyang and Rilli with the Teesta.
No. 3.—Coppermine ghât, about two miles below the latter.
No. 4.—Sivoke ghât (very little used), where the Teesta issues from the hills.

15. "I was able during my tour to examine in a proper way the forests of the Teesta and Rilli valleys, the upper forests around Laba and Dumsong, the Chel, Narchu, and Jaldaka valleys, and the greater part of the Terai forests. The whole of the country south of the Rilli, and lying between the Teesta and Chel rivers, must be examined during the current year, as it contains the best sâl, and as I had no time to go over it in the past season.

16. "*General descriptions of forests.*—The forests of the Dumsong sub-division are, generally speaking, of the same categories as those of the Darjeeling sub-division, and contain trees of every description, from the sâl and sissu of the Terai to the rhododendrons of the high altitudes.

17. "*Sâl* forests are said to occupy the whole of the lower face of the hills, from the Teesta to the Chel. There is little or none at all in the Terai, except a few scattered specimens near the Jaldaka on the south boundary. In the hills the sâl forest runs the whole way up along the Teesta river to below Dumsong, but does not appear to penetrate far into any of the lateral valleys, even the Rilli.

18. "*Sissu* forests are found in small patches on the banks of the rivers; they are generally quite pure and unmixed with khair: those on the Chel may turn out, on further inspection next season, to be worth reserving, but otherwise there are none of any value in consequence of their very small extent.

19. "*Mixed forest* is, properly speaking, the designation of the whole of the Terai forests, though the trees in those between the Chel and Murti are of such useless kinds that I have classed them as savannah to avoid mistakes.

The only true mixed plain forest is that between the Murti and Jaldaka, which consists of a fine tract of chilauni high forest, with a few sâl and toon, and numerous other kinds of trees.

20. "As *savannah* forests, as already mentioned, I class the forest between the Chel and Murti. Of long grass jungle there is very little, and that only towards the west; the whole of the rest of this almost unexplored tract consists, as far as I have seen or can ascertain, of creeper jungle, generally exceedingly dense and about ten feet high, with a few big trees interspersed. Those of any value are *Cedrela toona* (near the bank of the streams, especially the Murti, but very local and not common); *Duabanga Sonneratoides; Lagerstroemia parviflora; Terminalia Chebula* and *Belerica; Stereospermum Suaveolens* and *chelonoides*, and *Dillenia peutagyna*. The undergrowth is very curious, thickets of small trees like *Sponia velutina*, *Tetranthera sp.; Turpinia poncifera; Castanopsis Roxburghii*, &c., and in some places merely a dense growth of '*Buddleia neemda*,' '*Conyza arborea*,' '*Sponia velutina*,' and '*Artemisia Indica*,' the whole intertwined with small wiry climbers, chiefly *Jasminum*, Convolvalaceae, *Cucurbitacea*, and *Leguminosa*, such as '*Mucuna*' and '*Abrus*.'

21. "*The lower hill forest*, gradually and almost imperceptibly changing into *upper hill forest*, occupies the greater portion of the east tract. The lower parts are chiefly rich in chilauni, which, in Dumsong, seems to replace the sâl almost all over the country east of the Chel.

22. "*Chilauni* is very common, and, in short, may be called the characteristic tree of the Dumsong forests, as it is constantly found from the level of the plains up to 5,000 feet and of very fine growth.

23. "*Toon* is common all over the lower hills and up to 6,000 feet, but only towards the Teesta does it appear at all gregarious. It is there found growing mixed with sâl, though not always of very straight growth. In some places, especially in the more out-of-the-way parts and at an altitude of 2,000 to 4,000 feet and more, particularly round Ambiokh and in the Jaldaka valley, it is found of very large size.

24. "The *India rubber* tree is probably confined to the Lish and Ghish Hills, the part not yet examined, as after careful inquiry none were found by me anywhere east of the Chel river, or indeed in the whole of my tour. Next year's inspections will, however, it is hoped, give better results.

25. "As we ascend the hills the vegetation gradually changes. The lower parts are chiefly filled with trees of the damp-loving kinds: big toon, chilauni, saj, lamputtia, are found. These gradually change at about 3,000 feet. Panisaj is more common, and at 4,000 feet the birch, alder, and chestnuts, &c., appear, and about 4,500 feet the usual vegetation is decidedly European in the inner ranges, as we constantly find birch, alder, poplar, oak, chestnuts, maple, and cherry, while other common trees are *Michelia Cathcartii*, *Ostodes paniculata*, *Cinnamomum albiflorum*, *Engelhardtia spicata*, &c.

26. "At about 6,000 feet (altitude of Dumsong) we find oaks (*Quercus spicata*, *annulata*, and one other sp.), *Michelia lanuginosa* and *Cathcartii*, *Engelhardtia spicata*, chestnuts (*Castanopsis Indica* and *tribuloides*), laurels (*Daphnidium*, *Machilus*, *Phœbe*, *Cinnamomum*, *Tetranthera*, *Actinodaphne*, and *Aperula*); *Myrsine Capitellata*, *Echinocarpus dasycarpus*, *Betula pubescens*, maples (*Acer Sterculiaceum*, *lavigatum* and another sp.), *Alnus nepalensis*, *Engenia cerasoides*, *Leea sambucina*, &c., while waste places abound in *Moesa Indica* and another sp., *Teucrium Macrostachyum* and *Macaranga*. The forest undergrowth is chiefly *Symplocos*, *Myrsine*, and *Ardisia*.

27. "As we ascend thence, we gradually lose the more tropical of these forms, and come upon the *Quercus lamellosa*, *Michelia excelsa* (rare), *Betula cylindrostachya*, *Andromeda ovalifolia*, &c., while at 8,000 feet we find *Rhododendron Argenteum* and *arboreum*, *Agalma tomentosum*, &c.

28. "The absence of the long grass which so incumbers the lower forests in Darjeeling, and the shrubs which fill up the upper hills, is a very remarkable feature of the Dumsong forests; but still more so is the comparatively youthful appearance of the upper hill forests, when contrasted with such forests west of the Teesta as those of Gumpahar and Sinchal."

JULPIGOREE DIVISION.

29. In addition to the forests under departmental management, the Conservator examined, in company with Mr. Home, the divisional officer, a block of forest situated between the Teesta and Durlah rivers, north of Julpigoree, which must have been overlooked when the Government open forests were marked off in 1870. The forest covers an area of about 25 square miles drained by the Apalchand nuddy, a tributary of the Teesta; it contains very fine sâl, but only a limited number of old trees. Owing to its position it is of great value, since the timber and firewood can easily be brought to Julpigoree, one of the main stations on the Northern Bengal State Railway. It is proposed to reserve the tract at an early date.

SUNDERBUNS DIVISION.

30. The examination of the Sunderbuns forests was carried out during the years 1872-73 and 1873-74, and the results are recorded in the reports for these two years. During the year under review Sir Richard Temple visited the Sunderbuns, and the Conservator of Forests spent some time in them. The result of these further investigations is, that the opinions regarding the inexhaustibility of the forests have been somewhat shaken. The following remarks are taken from a report submitted during the year by the Conservator, and which may be found interesting.

31. The Ganges and Brahmaputra, the great drainers of the Central and Eastern Himalayas, may be said to be the parents of the Sunderbuns. These two rivers, in carrying year after year large quantities of silt from the mountains to the plains, and thence on through the numerous branches of their combined delta to the Bay of Bengal, have in course of time formed the Sunderbuns, and indeed a great portion of the plain of Bengal itself. The action still continues, and consequently the formation goes on, though it may be almost imperceptible at the time. Owing to this mode of formation, the Sunderbuns show the lowest level near the sea-face, and they rise slowly towards the north. But there appears to be a second mode of rise, and that is from south-west towards north-east, so that a point twenty miles from the sea in the eastern portion would generally be of a higher level than a point twenty miles from the sea in the western part. Hence it comes that the highest parts of the Sunderbuns are found in the north-eastern corner, near Morellgunge, and the lowest in the south-west, that is to say between the mouths of the Mutlah and Hooghly rivers. The peculiarity here indicated in a general way is of the greatest importance with regard to the vegetation, as will be seen further on. The lower parts of the Sunderbuns are inundated at every flood-tide; fresh deposits are made, until they get by degrees beyond the reach of high water, except on the occasion of spring or other exceptionally high tides, when the whole of the present Sunderbuns is inundated. Barring these occasions, the north-eastern parts are from one to two feet above high-water mark.

32. The soil on the Sunderbun islands being river deposit is of a light nature, and consists, as a rule, of sand and loam mixed in different proportions, occasionally also with clay, and now covered with large quantities of vegetable mould. On the whole the soil must be very fertile; but owing to the inundations by salt water, it is adapted for certain classes of vegetation only.

33. For many years past, as the formation of soil proceeded from north to south, and as the northern islands rose above high-water mark, cultivation seems to have proceeded in the same direction, and so we find now the northern parts of the Sûnderbuns under cereals. But still a large area is uncultivated, and it is with this unleased portion that we have to do in the present instance.

34. The vegetation in the Sunderbuns comprises about 40 different species of trees and shrubs; of these, the following three are the most characteristic:—

Goran	...	...	... *Ceriops Roxburghiana.*
Gangwa	...	...	... *Excoecaria Agallocha.*
Sunder, or Sindri	...	...	... *Heritiera littoralis.*

To these should be added two palms—Golpatta (*Phoenix paludosa*) and Hital.

It appears that new-formed islands which are still inundated by every flood-tide become covered with a growth of Goran, alternating with strips and patches of Hital or Golpatta. As the level of the islands rises, other trees settle on them, and of these Gangwa is the most frequent. When the level is further raised, so that the islands are flooded occasionally only by salt water, Sunder makes its appearance, and soon occupies the greater portion of the land. Thus we find the Sunder forests chiefly in the north-eastern portions, that is to say on the highest lands,—Goran along the sea-face and in the west, and Gangwa in the intermediate islands. It must not be understood, however, that the above general distribution is carried out strictly. Sunder appears vigorous and as a full-grown timber-tree only in the north-east portion of the area, and it dies gradually away on proceeding to the south and west. Goran is most numerous in the lower lands, and it would probably grow just as well on the higher land if it had not to give way to other trees. Gangwa is most numerous in the intermediate compartments; but it spreads into the Sunder tracts on the one hand, and into the Goran tracts on the other.

35. Of the remaining trees, the following are the more important :—

Baen	...	...	... *Avicennia tomentosa.*
Kiaura	...	...	... *Sonneratia apetala.*
Kolsha	...	...	... *Aegiceras corniculata.*
Poshur	...	...	... *Carapa obovata.*
Shingr	...	...	... *Cynometra bijuga.*
Latmi	...	...	... *Amoora cucullata.*

36. *Sunder* is of the first importance. It grows into a tree of up to 60 feet high, and of six feet girth, a larger circumference being rare. The heart wood is of a brownish red colour, hard and very heavy, one cubit feet of green timber weighing as much as 104 pounds. It is used for a great variety of purposes, as beams, buggy-shafts, planking, posts, furniture, firewood, but chiefly for boat-building. Indeed without this timber the boat traffic in Lower Bengal could never have reached the extent which it has now; and the permanent supply of this timber is therefore of the highest importance for the welfare of the people in the 24-Pergunnahs, Jessore, Backergunge, and the adjoining districts.

Gangwa grows to a height of 40 feet and a girth of five feet. Its timber is white, and not very lasting : it is used for general carpentering purposes, for posts and for firewood.

Goran reaches generally a hegiht of 25 feet, sometimes up to 35 feet, but rarely more than one foot six inches girth. The wood is of a red colour, and is extensively used for posts and for firewood; the bark is used for tanning.

Baen reaches a height of 60 feet, and gives a white heavy wood, very brittle, which is used for firewood only.

Kiaura grows 60 feet high, and its wood is of a light colour, used for planking and firewood, but not much prized.

Kolsha reaches a height of 25 to 30 feet, and is used for firewood.

Poshur grows 45 feet high. Its wood is used for building purposes, furniture, and firewood : it lasts fairly well.

Shingr, a small tree, up to 20 feet high. Wood whitish, hard : used as firewood.

Latmi grows up to 45 feet high. Wood white, hard, and heavy : used for building purposes and firewood.

Hital is cut for rafters, which are said to last up to 15 years.

Golpatta is used for thatching all over the districts adjoining the Sunderbuns ; it is said to last up to five years.

Most of the remaining trees are made use of, but chiefly as firewood.

37. Throughout the Sunderbuns the growth of the vegetation is very vigorous, and where cutting has not cleared the ground, it is covered with a dense mass of vegetation. The trees also grow very fast, and the wood-cutters say that a full-grown sunder-tree is only some 20 to 25 years old. Although this statement is not to be relied on, still there can be no doubt that it is a short-lived tree, which is proved by immense numbers of dead trees that have evidently died a natural death. It would appear that sunder rarely attains a higher age than 50 years.

38. Reproduction is most favourable. On all land flooded by ordinary flood-tides, a new growth of jungle springs up immediately where the old material has been removed, as the seeds are carried on the lands by the water. And the same may be said of the lands above ordinary floods, provided a sufficient number of seed-bearing trees remains ; but where the latter is not the case, as on extensive clearings, reproduction is very uncertain, and at any rate very slow. It has been put forward that reproduction all over the Sunderbuns is unlimited, and that cleared blocks will be covered again with forest in a very short time. This view does not hold good in the case of land above ordinary high-water mark, and consequently in the sunder-tracts. If such lands are once cleared, grass will spring up, and a growth of timber-trees can only establish itself by very slow degrees, and after a very long lapse of time,—a fact which is proved in several places in the north-eastern Sunderbuns. The cleared land, if left to itself, will have to take its chance of a few trees settling on it; but a general reproduction will not take place until such isolated settlers themselves begin to bear seed.

39. As one reason that reproduction is equal to the demand, it has been brought forward that large numbers of dead trees are observed over the Sunderbuns. But on examination it will be found that the dead trees were all of inferior quality, either unsound or badly shaped, so that timber-cutters did not consider it paying to remove them.

40. The Sunderbuns yield year after year immense quantities of forest material for all adjoining districts, especially the 24-Pergunnahs, Jessore, and Backergunge. Endless numbers of boats proceed in the dry weather to the forests and return laden with timber, especially sunder, rafters, firewood, thatching-grass, &c., to supply which there is no other source available, and consequently it is our duty to see that the supply is not exhausted. Moreover, the demand is certain to increase, and we must therefore make sure that the increase also is provided for. It has been said that the supply is inexhaustible, but such is not the case. It appears, on the contrary, that the western part of the Sunderbuns, which is that nearest to Calcutta, is already exhausted to a very large extent, and that fuel-cutters proceed more to the east year after year. Even in the sunder-tracts one sees for long distances from the rivers' banks nothing but dead sunder-trees and seedlings. No doubt, the centre parts of the islands still contain large quantities of full-sized trees; but then it should be remembered that nearly all islands consist of marshy ground, and that all material has to be carried or dragged by men to the banks of the rivers and nullahs ; so that, practically, a great portion of the available stock must be considered as beyond reach. Moreover, owing to the absence of accessible and superior fuel in the western half of the islands, fuel-cutters resort more and more to the sunder-tracts in the east, and here they cut, not dry trees or the branches of the trees felled for timber, but saplings of sunder of good growth, which are easier to cut than dry wood, and which pack closely in the boats. Indeed, herein lies the great danger of the supply of sunder-timber for boat-building being exhausted. If the straightest and best saplings are cut for fuel year after year, and in the accessible parts of the forests, it is but natural that the supply of full-grown timber must fall short. This explains why the boat-builders in the Backergunge district, where boat-building is chiefly carried on, have complained for some years past that they cannot

obtain now the same class of sunder-timber which they used to get in former years,—a point to which Sir Richard Temple drew attention in a note on the Sunderbuns, dated September 1874.

41. In consequence of these considerations, 885 square miles of the best sunder-tracts have been set aside as a reserve, a detailed description of which will be found in Section II of this Report.

CHITTAGONG DIVISION.

42. Since the year 1870 a steady examination of the forests in the Chittagong Hill Tracts has been carried on, and the results have been recorded in successive annual reports. During the year 1874-75 the Conservator of Forests spent two months in the division, and he thinks he collected some further data, which are worth being recorded here.

43. Chittagong is situated on the western slopes of the Indo-Burmese range. It is bounded on the north by Cachar and the Tipperah Hills, on the south by Arakan, on the west by the sea, and on the east by the country of the Shendus and the Arakan Hill Tracts. The country thus defined reaches an elevation of close on 5,000 feet on its eastern boundary, and it sinks down to sea-level on the west. Hence it comes that the eastern portion is composed alternately of hills and valleys, whereas the western part consists chiefly of level ground little raised above the sea, intersected here and there by low hill ranges. The whole tract is divided into two districts—the Chittagong Regulation District, comprising the lower ground near the sea-shore, and the Chittagong Hill Tracts, comprising the hilly parts towards the east. Their dimension will be seen from the following data:—

Name of District.	Area in square miles.	Total inhabitants.	Inhabitants per square mile.
Chittagong Regulation District	2,498	1,127,402	451
Chittagong Hill Tracts	6,882	69,607	10

44. Numerous streams take their rise from the Indo-Burmese or from side ranges, which first traverse the Hill Tracts, and then enter the Regulation District on their way to the sea. The larger and more important of these are the following, beginning in the north:

The Fenny,	The Martamori,
„ Kurnafuli,	„ Bagkhali, and
„ Sungu,	„ Naf.

Of these the Kurnafuli is by far the largest, as it drains more than half the area of the Hill Tracts. The streams enumerated, and an endless number of feeders, form a network of water channels all over the country, which are navigable by small boats or canoes high up into the Hill Tracts. On the whole, it may be said that Chittagong has good inland water communication for small craft.

45. The Conservator cannot give a detailed description of the geological formation of Chittagong, but he may state that the prevailing rock is sandstone, of a soft permeable nature, wherever it appears on the surface. The soil, in consequence, is sandy loam, of different degrees of quality in the hilly parts, with more clay on the level ground.

46. The climate of Chittagong is very damp, there being a considerable rainfall and heavy fogs during the dry season.

47. The Regulation District, with its dense population of 451 inhabitants to the square mile, is chiefly under cultivation, and forest or jungle is found only here and there on unculturable ground, as steep hills. The produce of this is far below the requirements of the people. In the Hill Tracts, on the other hand, we find only ten inhabitants to the square mile, and in consequence

by far the greater part of the district is under forest, and the produce of which is much larger than the requirements of the hill-people. Owing to these circumstances, large quantities of forest material are annually taken from the Hill Tracts to the Regulation District. The forests in the latter are either all private property or under settlement with cultivators, whereas the land in the Hill Tracts is considered the property of Government. The Forest Department has no connection with the former, and the following notes refer, therefore, only to the forests in the Hill Tracts.

48. The Hill Tracts may be called one huge forest, with small patches of cultivation here and there, and grass-lands on level ground near water-courses. The number of species of trees in the forests is very large, probably upwards of 500, and perhaps even more. To identify all species would require not only special botanical attainments, but also several years' time: hence the Conservator can give only the more conspicuous species noted during his short tour. Most of the species are found in all parts of the district, but there are also certain kinds which are found under particular circumstances, as, for instance, on the higher ranges or on low ground, or in the southern and moister parts, or in the outer hills, as compared with the inner ones. A list of the trees actually noted will be found in Appendix I. The perusal of the Appendix will show that the flora is chiefly of the Burmese character, with a number of Bengal species intermixed.

49. To classify the forests is somewhat difficult, since elevation keeps within a narrow compass, but the following four classes may be distinguished :—

1. Gurjun-oil forest.
2. Evergreen plain forest.
3. Hill, or bamboo forest.
4. Savannah tracts.

50. The gurjun-oil forests occupy the *outer hills* from one end of the Hill Tracts to the other, and this distribution is so marked that this class of forest hardly ever appears beyond the first watershed running from the north to the south. The chief tree is the wood-oil tree,—gurjun, B,—Kanyoung-wroak-ri, M, (*Dipterocarpus pilosus, Roxb*:), a tree of magnificent dimensions, like most Dipterocarpeæ. It is tapped for the wood-oil by incisions about two to three feet from the ground, which are periodically charred by fire to induce the flowing of the oil. Besides, the timber is very much valued, chiefly for planking and boat-building, so that there is great danger of this tree being rooted out altogether in course of time. Of other trees the following were specially noted :—

Petrach	...	...	...	*Amoora Rohituka.*
Akshi	...	...	...	*Dillenia pentagyna.*
Chaplis	...	...	...	*Artocarpus chaplasha.*
Ambolati	...	...	...	*Phyllanthus Emblica.*
Jam	...	...	...	*Eugenia sp.*
Boilsur	...	...	...	(?)

and small remainders of Jarul (*Lagerstroemia Reginæ*), with a fair quantity of bamboos.

51. All the country beyond the first watersheds is occupied by hill or bamboo forest on the rising ground, and by evergreen plain forest or savannah tracts on the level parts near water-courses.

52. The hill or bamboo forest contains almost every species mentioned in Appendix I, but its great feature is that the trees stand in large masses of bamboos. The chief trees are Chaplis, Gurjun (*Dipterocarpus turpinatus*), Telsur (*Drimycarpus racemosus*), Chikarassi (*Chikrassia tabularis*), Kandeb-?, Tali (*Isona drapolyantha*), Jam, Nagesur (*Mesua ferrea*), Chakua (*Albizzia stipulata*), and Jarul in small numbers. In former times this class of forest produced also Toon (*Cedrela toona*), but it has now been almost rooted out, at any rate the Conservator did not meet with a single specimen.

53. The evergreen plain forest is generally very dense, and its chief tree is the Chalta (*Dillenia Indica*), which appears in very large numbers. This forest is the present home of the Jarul tree (*Lagerstroemia Reginæ*), and which appears, as a rule, on the lower ground. The quantity of Jarul now available is very limited, as it is the wood most valued in Chittagong and unless special care is taken, it will disappear altogether within a short time. Gamhar (*Gmelina*

arborea) appears chiefly in this class of forest, but also in the hill or bamboo forest. Another characteristic tree is Thabola (*Echinocarpus sterculiaceus*), which appears in large numbers: though a fine large tree, the timber is not valued.

54. The savannah tracts are not of great extent, and they contain generally few trees only, as Simul (*Bombax Malabaricum*), and Kum (*Nauclea sericea*), or none at all.

55. The system of forestry in force in the Hill Tracts until a few months ago may be shortly described as follows:—

(*a*).—The hill-men had the free run of the forests for their domestic requirements.

(*b*).—Individuals who desired to export forest produce had to take out a so-called "permit" to cut or remove the material.

(*c*).—On passing certain stations situated on the banks of the rivers coming from the Hill Tracts, the Government levied a toll from forest produce according to a sanctioned scale.

(*d*).—The Commissioner of Chittagong was *ex-officio* Conservator of Forests for Chittagong, and the Assistant Conservator of Forests was subordinate to the Deputy Commissioner of the Hill Tracts, and through him to the Commissioner.

56. The effects of the above system have been detrimental to the forests, as the free run of them, and the almost unrestricted cuttings, have told very severely on the growing stock of timber. Jarul, the most valuable of the Chittagong woods, appears to have had its natural home in the outer hills (similar to what the Conservator observed some years ago in the adjoining Arakan division), whereas it appears in small patches only on proceeding to the inner hills. At the present moment Jarul may be said to have almost entirely been rooted out in the outer hills. Toon was formerly brought from the forests, and even exported to the Madras coast. It may be said to have disappeared now from all accessible forests. Of Chaplis a good stock is still available in the upper parts of the valleys. Gamhar and Kandeb appear still in fair numbers. Chikarassi is found here and there, but Telsur is rare, except on the higher ranges in the south. Thus it will be seen that the supply of the first class timber-trees has become very precarious.

57. The great enemies of forest conservancy were—

(1) The practice of jooming over the greater part of the forests; and,
(2) The wasteful manner in which timber has been cut.

58. Although the Jumeahs may not cut many large trees on the areas to be cultivated, still they cut and burn periodically all seedlings, saplings, and young trees, consequently there is no reproduction, whereas mature trees are removed year after year.

59. Besides the above, enormous quantities of saplings and young trees have been destroyed annually through the practice of cutting so-called dug-outs. The waste of timber in preparing these boats is very great, but it is surpassed even by the following practice: Dug-outs, except those of Jarul, are usually cut in the hilly parts of the forests, at a distance of up to two miles from the banks of the floating streams. When a dug-out is ready, a road or track from the boat to the floating stream is laid out. The next step is to cover the road with rollers about five feet apart, or, in a round figure, about 1,000 to the mile. For this purpose all the straight saplings and young trees in the neighbourhood are cut down indiscriminately, up to some 300 to 500 for one dug-out sometimes. No kind of tree is spared,—Jarul, Chaplis, Tali, Kandeb, they all fall under the axe under this barbarous system. Such wanton destruction must cause real pain to any one who has seen the trouble and labour it costs, and the amount of anxiety it causes, to raise timber-trees where the original forest has once been destroyed.

60. Furthermore, it has hitherto been the practice of bamboo-cutters to cut saplings and young trees of all kinds, and to remove them for house-posts. In short, there can be no doubt that the forests were on the road to ruin;

and in fact valuable timber-trees are now only found high up the valleys, and in many cases in inaccessible places.

61. In forming proposals for a change of management, it had to be borne in mind that the hill-people have to depend, for a long time to come at any rate, on joom cultivation, and that they also seem to rely to some extent on the money earned by the removal of timber. Furthermore, it is essential that the people should be entirely under the district officers, and consequently the Conservator offered the following suggestions:—

(*a*).—Two classes of forests are to be formed, "reserves" and "district forest."

(*b*).—The reserves will be entirely under the management of the Forest Department, and the district forests under that of the Deputy Commissioner of the Hill Tracts.

(*c*).—No jooming or cultivation of any other kind should be allowed in the reserves; no timber or other forest produce to be cut in, or removed from, the reserves without the permission of the Forest Department; the area to be managed for forest purposes only.

(*d*).—The people of the district may supply themselves with forest material for their domestic requirements from the district forests, with such restrictions as the Deputy Commissioner may impose from time to time. On the other hand, the export should be subjected to the following restrictions:—

No logs of the undermentioned kinds will be allowed to pass the revenue stations unless they measure three cubits in girth, measured at three cubits from the thick end:—

Jarul,	Gamhar,
Chaplis,	Toon,
Kandeb,	Chikarassi, and Telsur.

In addition, the Deputy Commissioner should set aside certain forests easy of control, in which no dug-outs are to be cut. This might be done after consultation with the Forest Department.

(*e*).—With the view of discouraging the preparation of dug-outs and the excessive consumption of Jarul, the rates for dug-outs and for Jarul timber now levied should be enchanced 50 per cent., and the export of dug-outs of Jarul prohibited altogether.

(*f*).—The management of the revenue stations should be under the Forest Department, as hitherto.

(*g*).—The divisional forest officers should be under the orders of the Conservator of Forests, Bengal, instead of under those of the Commissioner of Chittagong.

These proposals were approved of by the Commissioner of Chittagong, and they received the sanction of His Honor the Lieutenant-Governor. Since then three large tracts were declared reserves, a description of which will be found in Section II.

SECTION II.—RESERVES.

62. As mentioned in the introductory remarks, we have made good progress in the selection of reserves or State forests during the year. The following table shows the area of the reserves at the beginning and end of the year 1874-75:—

Divisions.	Area at beginning of the year 1874-75.	Added during the year.	Total at the end of 1874-75.
	In square miles.		
Darjeeling	106	.....	106
Julpigoree	14	115	129
Palamow	.....	.....	.....
Sunderbuns	.....	885	885
Chittagong	.....	347	347
Total ..	120	1,347	1,467

In addition, the following area has been reserved since the close of the year :—Chittagong division, 223 square miles. By the end of the year 1875-76 the total area of reserves, it is hoped, will reach 3,000 square miles.

63. As regards vegetation, we have, approximately, the following areas reserved :—

Sâl reserves, including limited areas of sissu and intersected by savannah tracts	185	square miles.
Darjeeling hill forest	50	„ „
Sunder forest	885	„ „
Chittagong mixed forest	347	„ „
Total ...	1,467	„ „

DARJEELING DIVISION.

64. From last year's report it will be seen that up to the 1st April 1874 an area of 18,644 acres in the Terai and lower hills had been examined in detail. During the year 1874-75 the Sukna forests, covering an area of 6,902 acres, have been examined and valued, making a total up to date of 25,546 acres, which are stocked as follows :—

Sâl forest	5,529	acres.
Lower hill forest containing sâl	11,813	„
Total sâl-producing area ...	17,342	„
Khair and sissu forest	895	„
Mixed plain forest	270	„
Savannah „	7,039	„
Total ...	25,546	„

With the exception of 501 acres, the whole of these forests form one block. Besides the areas valued, there are the Goramara, Latpanchor, and Manna forests, covering between 14,000 and 15,000 acres, unexplored, which, together with the above, form an uninterrupted forest of 40,000 acres in a round figure. Of these, about one-third is situated in the Terai, and the other two-thirds in the adjoining lower hills, from the Teesta on the east to the Selim Tea Estate. During the year 1875-76 the Goramara, Latpanchor, and Manna forests, will be examined and valued, and the Conservator hopes to give in next year's report a detailed working plan of the whole range, similar to what will be found further on regarding the Buxa forest. In the meantime not more timber will be cut than is absolutely required by local demand, and within the maximum normal yield.

65. *Dumsong.*—The selection of reserves in the Dumsong sub-district has been commenced during the year by Mr. Gamble, and 40 square miles are ready to be gazetted. A description of the general character of these forests has been given in Section I. The detailed record of the reserves will be given in next year's report, after the several areas have been gazetted.

JULPIGOREE DIVISION.

66. In last year's report the details of two reserves, the Dainah sissu forest = 1,132 acres = 2 square miles, and the Muraghat sâl forest = 7,680 acres = 12 square miles, were given. [*Remark.*—In last year's report the area was given as 7,688 acres by mistake.] During the year two further reserves have been gazetted, one extending over 3,240 acres = 5 square miles, adjoining the Muraghat reserve, and another, covering 70,459 acres = 110 square miles, called

the Buxa plain reserve, thus bringing the total area of reserves in this division at the end of the year up to 82,511 acres = 129 square miles.

The Dainah sissu reserve	1,132 acres =	2	square miles.
„ Muraghat sâl „	10,920 „ =	17	„
„ Buxa plain „	70,459 „ =	110	„
Total ...	82,511 „ =	129	„

67. *The Muraghat Sâl Reserve.*—Gazetted partly on the 18th March 1874 at page 583 of the *Calcutta Gazette*, and partly on the 9th December 1874 at page 1762 of the *Calcutta Gazette*.

1. *Area*—

Reserved in 1873-74	7,680 acres =	12	square miles.
„ „ 1874-75	3,240 „ =	5	„
Total of the reserve ...	10,920 „ =	17	„
Actually covered with sâl	3,168 „		
Savannah, formerly chiefly sâl, and capable of conversion into sâl ...	7,752 „		
Total ...	10,920 „		

The addition made during the year consists chiefly of savannah, and this was done because without this step it would have been difficult to keep out fires. Now the reserve is bounded on three sides by rivers, whereas on the fourth side a fire-path has to be cleared.

2. *Boundaries.*—These stand now as follows:—

North-east.—A demarcated line running from the source of the Kanai nuddy to the source of the Garati nuddy. *East*, the Garati nuddy, then a short line to the source of the Ghairkuta nuddy, then the Ghairkuta nuddy; *South*, the Nonai nuddy, from its junction with the Ghairkuta nuddy westward; *West*, the Kanai nuddy, and then the Nonai nuddy.

3 *to* 11. Topographical description, soil, forest, timber-depôts, markets, export, villages, rights of population, and map, the same as recorded at page 15 of the annual report for 1873-74.

12. *Working plan.*—The growing stock of sâl-trees in February 1873 on the area actually covered with sâl stood as follows:—

Seedlings (under 1′ 6″ girth)	100,608
Saplings (1′ 6″ to 3′ 6″ girth)	50,410
Young trees (3′ to 4′ 6″ girth)	19,042
Trees (4′ 6″ to 6′ girth)	1,515
Old trees (above 6′ girth)	15
Total sâl-trees ...	171,590
Trees of 3′ girth and upwards only	20,572

The reserve takes its place in the general working plan for the sâl forest in the Julpigoree division. There are no cuttings of growing trees to be made in this block before 1883 at any rate. In the meantime it is to be protected against fire, grazing, and cultivation. If necessary, sâl-seed will be scattered over the savannah blocks.

68. *The Buxa Plain Reserve.*—Gazetted on the 19th December 1874 at page 1762 of the *Calcutta Gazette*, modified by notification dated the 6th August 1875, at page 1031 of the *Calcutta Gazette* of the 11th August 1875.

The reserve is situated at the foot of the Buxa hills on both sides of the military road from Cooch Behar to Buxa.

1. *Area*—

Name of Block.	Sâl forest.	Khair and sissu forest.	Savannah.	Cultivated land.	Total.	
					Acres.	Square miles.
Raimatong	4,224	402	510	.....	5,136	8
Poroh	12,477	1,002	2,790	51	16,320	25
Rajabhatkowa	15,699	1,504	10,173	627	28,003	44
Panbari	15,206	773	4,341	680	21,000	33
Total in acres ..	47,606	3,681	17,814	1,358	70,459	110
Total in square miles ...	74	6	28	2	110	

Furthermore, detailed surveys may yield results slightly differing from those given above, but for the present management the areas as now given will be quite accurate enough.

2. *Boundaries.*—North.—A demarcated line running along the foot of the Buxa hills from the Kala nuddy to the Guddadur nuddy.

East.—First the Guddadur nuddy as far as the southern boundary of the Sunniasi jhar taluka; then a demarcated line skirting the sâl forest to the Cheko nuddy, down that river, round the cultivated land, so as to exclude the latter, following again the outskirts of the sâl forest to the Guddadur; down the Guddadur for some distance, then, following the outskirts of the sâl forest, again round the cultivation of Thelchangpara, so as to exclude the latter, to the Cheko nuddy and down it for a short distance.

South.—A demarcated line starting from a point 3,000 feet south of the 18th mile-post on the Cooch Behar–Buxa road, on one side, in an eastern direction as far as the Cheko nuddy, and on the other side first in a western and then west-south-western direction as far as the Poroh nuddy.

West.—The Kala nuddy from the northern boundary to its junction with the Gurm nuddy; then the western edge of the khair and sissu forest to the Norok nuddy; then a demarcated line running in a westerly direction opposite the 23rd mile-post on the Cooch Behar–Buxa road from the Narok nuddy to the cultivation of Dhum; round this cultivation, so as to exclude it, then along the edge of the sâl forest in a northerly and then westerly direction to the Nimati nuddy; down the latter, then following the outskirts of the sâl forest to the Barmini nuddy, down the latter to the Poroh nuddy, and then the Poroh nuddy to the southern boundary.

3. *Topographical description.*—The reserve comprises a tract of almost level country, about 10 miles broad, stretching from the foot of the Buxa hills towards the south for about 10½ miles, with a very gentle fall from north towards south. There are some plateaus raised above the general level of the reserve, and along the water-courses depressed strips of land are common, which at one time or other formed the beds of these rivers. The area is drained by the Poroh and its feeders in the western part, by the Guddadur on its eastern boundary, and by the Dima and Balla nuddies, which two streams traverse the whole tract from north to south, dividing the area into three approximately even parts.

The Poroh takes its rise some five miles from the hills. The Dima, Balla, and Guddadur, come from the hills. They carry various volumes of water during the rains, but they are dry in the dry season from the foot of the hills until about seven or eight miles to the south of them, owing to their water sinking into the ground just at the foot of the hills. The water apparently moves on under ground, and about five miles from the hills begins to appear again in the shape of numerous springs, which form a network of little branches that lead the water back to the rivers. Hence there is no water to be found in the northern half of the forest during the dry season.

The Poroh joins the Dima at about four miles south of the forest, forming the Kalajani, which a little lower down takes in the Balla nuddy, called Cheko, at its lower end, and the Guddadur. The Kalajani joins lower down the

Bramaputra, and it is fit for floating at all seasons of the year; but the Poroh, Dima, Balla, and Guddadur, are supposed not to be fit for floating, owing to the rapidity of the water in the rains and the want of it in the dry season. Further inquiries on this point will however be made.

The climate in the reserve is very damp. At the station of Buxa, three miles to the north of the reserve, at an elevation of 1,800 feet above the sea, the following is the average yearly rainfall for four years—

	Inches.
January to May	35
June to September	204
October to December	17
Total ...	256

4. *Soil.*—A good sandy loam, occasionally with gravel in the sâl forest and savannah, and a sandy soil mixed with gravel in the khair and sissu-tracts.

5. *Description of forest.*—The chief classes of vegetation are—

Sâl forest.
Khair and sissu forest.
Savannah.

The sâl forests and savannah appear on the high ground, whereas the khair and sissu forests occupy the low grounds along the banks of the rivers. There is, however, one exception, the Panbari khair forest, which is situated in the middle of sâl on ground of the same level as that of the sâl forest, the only difference being that the soil on the khair forest is of a more stony description than in the sâl forest. Here and there, in moist parts, patches of evergreen forest and canebrakes are met with.

The composition of these classes of forest may be shortly described as follows :—

The sâl forest contains chiefly—

Sâl	*Shorea robusta.*
Akshi	*Dillenia petagyna.*
Kumbi	*Carega arborea.*
Udal	*Sterculia villosa.*
Sida	*Lagerstroemia parviflora.*
Aula	*Phyllanthus Emblica.*
Chilauni	*Schima Wallichü.*
Bahura	*Terminalia Belerica.*
Harra	„ *Chebula.*
Amaru	„ *tomentosa.*
Jamun	*Engenia jambolana.*
Ditto	„ *obovata.*
Gambari	*Gmelina arborea*, and about 50 other species.

In the moister parts, especially near the banks of water-courses, the following species are found:—

Toon	*Cedrela toona*, a few
Bandorholla	*Duabanga sonneratoides.*
Katus	*Castanopsis Roxburghü.*
Chalta	*Dillenia Indica.*
?	*Aesculus Assamica.*
Gunseroi	*Camphora glandulifera.*
Bor	*Ficus elastica*, a few trees near the Dima, and several other species of Ficus in this kind of forest as well as in the sâl-tracts.

The khair and sissu forest is very poor in species; it contains—

Sissu	*Dalbergia sissu.*
Khair	*Acacia Catechu.*
Siriss	*Albizzia sirissa.*
Safet siriss	„ *elata.*
?	*Odina Wodier.*
?	*Premna latifolia.*
Dhudkuri	*Holarrhena pubescens.*

The savannah-tracts, the greater portion of which must have been sâl forest formerly, are now mostly open glades of tall grass, and a few trees here and there, as sâl in single trees and little patches, a few Simul (*Bombax Malabaricum*), a small species of *Engenia* sometimes called "bastard sâl" (*E. abooata*), Palas (*Butea frondosa*), Jamti (*Callicarpa arborea*), and others. In some parts of the savannah-tracts strips of worthless scrub-jungle are found, but on the whole these are not of great extent.

The contents of valuable timber will be given further on, but in a general way it may be said that the Buxa sâl forest belongs to the *very best* in Bengal. The trees are of a very fine shape, and attain large dimensions: in fact the position, soil, and climate, must be considered as highly favourable to the production of sâl. Though now comparatively poor in mature timber, owing to former maltreatment, the forest will yield at once an annual surplus of about Rs. 20,000, and which, with proper treatment, will rise hereafter to not less than one and a half lakh of rupees per annum; as most parts of the sâl-tracts are well stocked with seedlings, saplings, and young trees, which will be augmented by the sâl-crop to be raised on the savannah-tracts.

The khair and sissu forests on the Kala, Dima, and Balla nuddies, contain more sissu than khair, of tolerable quality. Many parts of the area are badly stocked. The khair forest, in the Panbari sâl forest, contains trees of good growth up to maturity; it is almost pure khair.

6. *Timber-depôts.*—The main depôt is at Alipore, situated where the Cooch Behar–Buxa road crosses the Kalajani river, five miles from the southern boundary of the reserve. Besides this there are forest-depôts along the Cooch Behar–Buxa road.

7. *Timber-markets.*—The towns and villages in the Cooch Behar State, the districts of Rungpore, Bogra, Pubna, Mymensing, Dacca, and others.

8. *Lines of Export.*—From the forest to the Cooch Behar–Buxa road, down that road to the Alipore depôt, from the Alipore depôt down the Kalajani to the Bramaputra and Ganges.

9. *Villages within the Reserve.*—The following villages were inside the reserve on the 9th December 1874: (1) Mechpara, (2) Garopara, (3) Dima, (4) Buffalo-owners' village on Dima, (5) Baromali, (6) Kultia, (7) Galaton, (8) Doyalpara, (9) Rajabhatkaua, and (10) Minagaon. The first eight of these villages, comprising in all about 130 houses, are inhabited chiefly by Mechis and Garos, who change the site of their villages and cultivation periodically. They have no right to the soil, and pay a capitation-tax to Government. With the approval of the civil authorities, and by them, these people have received notice that they must move outside the reserve on their next change of cultivation, to take place within three years, from the 9th December 1874.

After the 9th December 1877 there will only remain two enclosures, Minagaon and Rajabhatkaua, which are inhabited by dâk-runners. Regarding these two villages, the following notification has been gazetted when the reserve was formed:—

"A block of 20 acres will be marked off for the use of each of these two villages. The sâl-trees within the areas thus marked off will be removed by the Forest Department if required. The inhabitants will be entitled to collect such dry sticks and minor forest produce, except of sâl, toon, or India rubber, as may be required for their domestic purposes, from the forest, within a radius of one-fourth of a mile around their villages; the area thus defined will be marked off. They will also be allowed to graze their cattle within the same tract. No family will be allowed to take up its residence in these villages without the permission of the Conservator of Forests. The villages will be removed outside the forest at any time that the Government may consider it necessary to do so."

10. *Rights of surrounding population.*—None.

11. *A map* of the reserve, on a scale of two inches to the mile, has been prepared.

12. *Working Plan.*—In drawing up a working plan for the Buxa plain reserve, it had to be taken into consideration that the Barojhar Satalia forest,

comprising an area of 28,862 acres, adjoins it, and has its outlet also by the Kalajani river. Hence these two forests should be worked under the same working plan. The Barojhar Satalia has not as yet been examined in detail, but so much is known that it contains from 12,000 to 15,000 acres of sâl forest, and that it is not quite so rich in mature timber as the Buxa reserve. The next point is that the working plan of a mixed forest should be arranged in the first instance chiefly with reference to the most important species of tree, in this case *sâl*. It is further known that the approximate rate of growth of sâl in these forests is as follows:—

Age of tree of	1′ 6″	girth at	4′ from	ground ...	30 years.
Ditto	3′	ditto	ditto	...	60 ,,
Ditto	4′ 6″	ditto	ditto	...	90 ,,
Ditto	6′	ditto	ditto	...	120 ,,

Furthermore, it has been ascertained that the mature trees in the Buxa reserve are not to be found in certain areas, but that they are scattered unequally over the different parts of the sâl-tracts. It should further be recorded that on the one hand the purpose for which the reserve has been formed is to provide the country to the south of the forest principally with large timber, and that, on the other hand, the sale of smaller timber is more remunerative to Government. Furthermore, the forest is now comparatively poor in mature timber, whereas it is far more favourably stocked with young timber.

Starting from these data, it appears indicated that the Buxa reserve and the Barojhar Satalia, about to be reserved, should be worked together, in the first instance with a revolution of 40 years, and that at the outset no sâl-tree of less than five feet girth, measured at four feet from the ground, should be cut. In this way the trees, when cut, will measure on an average about six feet in girth, or about two feet in diameter.

With the view of cutting hereafter only sâl-trees of six feet in girth and upwards (barring thinnings), the minimum girth should be gradually raised: thus, after five years to 5′ 3″, after 10 years to 5′ 6″, after 15 years to 5′ 9″, and after 20 years to 6′.

In order to equalize the annual outturn, after ascertaining the stock of growing material and the increase thereon in the different blocks, the average annual yield for the next 40 years would have to be calculated, and then that amount should be cut year after year in that part of the forest which is richest in mature timber. But there are several drawbacks to this method. In the first instance the growing stock of material and the increase thereon must be ascertained accurately—an operation which requires much time, as many of the necessray data can only be collected in course of time. Secondly, our Indian forests contain in their present condition always great numbers of trees, which, though they would appear in the survey figures, are not saleable. Hence it appears far more advisable in cases like the present to regulate the annual yield *by areas and maximum annual yield combined*, in the following manner easily to understand.

For working purposes the following five blocks have been formed:—

Name of Block.	Area of sâl forest.	Proportion of area of sâl forest in each block to total area under sâl, in fortieths of the total area.
I.—Raimatong	4,224	3
II.—Poroh	12,477	7
III.—Rajabhatkaua	15,699	10
IV.—Panbari	15,206	10
V.—Borojhar Satalia	15,000 approximately.	10
Total ...	62,606	40

If regulated by areas only, the Raimatong block would occupy three years, the Poroh block seven years, the Rajabhatkaua block 10 years, the Panbari block

10 years,—total Buxa forest 30 years; and the Borojhar Satalia 10 years. Of these blocks, the one which is comparatively richest in mature timber should be taken in hand first. The Borojhar Satalia is presumably poorest, consequently it will come last of all. In order to ascertain the relative merits of the remaining four blocks, a system of valuation surveys has been made in them by Mr. Johnston, Assistant Conservator of Forests. The survey lines were chosen two miles apart, running due east and west from one end of the reserve to the other. In this manner the survey lines were as equally as possible distributed over the forest. The total area surveyed and valued amounts to 689·61 acres, equal to a strip of forest 56 miles long by 100′ broad, on which every sâl, sissu, khair, and chilauni-tree, has been measured (*see* Appendix II). From the data thus obtained it has been calculated that the several blocks contain the following sâl-trees of 5′ girth and upwards per acre :—

	Sâl-trees.
Raimatong sâl forest	= 3·10
Poroh „	= 5·23
Rajabhatkaua „	= 2·82
Panbari „	= 3·35

Consequently the Poroh block should be taken in hand first. But there is another point to be considered, which is this. In working an Indian forest regularly for the first time, the greatest difficulty is to start the work in a satisfactory manner. Hence that part of the forest which is easiest to work should, if otherwise practicable, be taken in hand first. Now, the Poroh block is not easy of access at present, owing to the Dima nuddy being situated between it and the Cooch Behar–Buxa road, whereas the Rajabhatkaua block is traversed from one end to the other by the above-mentioned road, so that it has been considered advisable to take the last-mentioned block in hand first. When the work has been going on for some years, it will not be difficult to transfer operations to the more remote parts of the forest.

In order to ascertain and equalize the annual yield, the actual contents of sâl-trees of five feet girth and upwards has to be ascertained by multiplying the contents per acre in each block with the area under sâl. Thus the following data are obtained :—

Raimatong block	= 4,224 × 3·10	=	13,094
Poroh „	= 12,477 × 5·23	=	65,255
Rajabhatkaua „	= 15,699 × 2·82	=	44,271
Panbari „	= 15,206 × 3·35	=	50,940
Total		...	173,560

Hence the average annual yield = $\frac{173560}{30}$ = 5,785 trees.

It should not be overlooked, on the one hand, that this calculation does not take notice of the increase on the growing stock during the next 30 years, and on the other hand, that this will be compensated by the intended raising of the minimum size of trees to be cut by three inches every five years.

By dividing the contents of each block by 5,785, the number of years during which each will yield the annual outturn is ascertained. Thus we find the following :—

Name of Block.	Number of years out of 30 for which the several blocks contain the annual yield.
Raimatong block	2·4
Poroh „	11·0
Rajabhatkaua „	8·0
Panbari „	8·6
Total ...	30·0

Having thus ascertained the period for which the Rajabhatkaua block has to provide the annual yield, we should now proceed and cut annually 5,520

trees in this block for the next eight years. But for reasons given it is advisable to return now to *areas*, and to work the block in the following manner.

Beginning from the northern boundary, roads fit for dragging will be cut due east and west from the Cooch Behar–Buxa road at intervals of one mile as far as the Dima nuddy on the west and the Balla nuddy on the east, thus forming 26 compartments of uneven size. Each of these will ordinarily contain a certain area of sâl forest, of khair and sissu, savannah, or of land which has been under cultivation. These compartments will be arranged into eight lots, so that each lot contains, as near as possible, an even area of sâl forest, or $= \frac{15392}{8} = 1{,}962$ acres. Every year one lot is taken in hand by cutting and removing to depôt (by dragging them to the Cooch Behar–Buxa road, and thence carting them to Alipore) all saleable sâl of 5′ girth and upwards, and all saleable sissu-trees of 4′ 6″ girth and upwards, measured 4′ from the ground, and by disposing of all other kinds of trees that may be saleable. This done, useless trees and all creepers on the valuable kinds of trees will be cut. Then a short time before the sâl-seed ripens all the refuse in the allotments will be burnt, together with the tall grass. When the sâl-seed is ripe, it will be collected in the surrounding compartments and scattered in all parts of the allotments, where there are no seed-bearing sâl-trees, except in the khair and sissu forest, where sissu-seed will be scattered. After this operation, fire and cattle must be kept out of the allotment until the area is fully stocked with sâl or with khair and sissu. In this manner it is proposed to convert the whole of the Buxa reserve into an uninterrupted sâl forest again, except near the banks of the rivers, where khair and sissu will be raised, or where other trees may be better suited. Should the plain sowing of sâl and sissu-seed not be sufficient to stock the blanks, modified measures, including planting, will have to be resorted to.

The details of this working plan for the first eight years will be found in Appendix III in a tabular form.

Before concluding this "working plan in outlines," the Conservator wishes to remark that his object was to prepare, for the first of eight years, a working plan as simple as possible, which can be understood by any forest-officer. Though based on scientific principles, the equalization of the annual yield has been ascertained in an approximately correct manner only, instead of by calculations difficult to understand by those who are not intimate with them, and which are liable of doing great mischief if adopted all at once. Moreover, the data at our disposal at this moment *veto* the adoption of a system more minute than that adopted by the Conservator.

69. Besides the 129 square miles of forest now reserved, there are extensive areas of open forests in this division, the greater portion of which will, it is hoped, be reserved during the year 1875-76, and arrangements to effect this are now being made.

70. The Government of India, in their resolution No. 345, dated 20th March 1875, on the annual report of this Department for 1873-74, have desired that in a future annual report the Conservator might state his views regarding the prospects of the future supply of sâl and sissu from the Sub-Himalayan forests of Bengal, as far as the data at his disposal may permit. The data at his disposal are as yet far from complete, but a general idea regarding the future supply of sâl may be obtained from the subjoined preliminary figures. It appears that the following areas of sâl-bearing forest exist in the Darjeeling and Julpigoree divisions:—

				Acres
Darjeeling, west of Teesta	...	...	...	35,000
„ east of „	...	...	...	20,000
Julpigoree (Western Dooars)	...	...	...	130,000
		Total	...	185,000

Owing to bad treatment for many generations, the present yield should not be more than 4,000 tons per annum. After 10 years the outturn might be raised to 6,000 tons, after 20 years to 8,000 tons, after 30 years to 10,000 tons,

and so on in a similarly ascending scale. It is difficult to estimate the final normal yield, but the Conservator has no hesitation in saying that it should not be short of 35,000 tons, provided the forests are taken care of and managed systematically, as indicated for the Buxa reserve during the first period of eight years.

The area of sissu forest is probably not more than 15,000 acres, representing a present yield of not more than 300 tons, and a prospective yield of, say, about 3,000 tons.

PALAMOW DIVISION.

71. During the year the forests in this division have been examined minutely by Mr. Johnston, and 96,522 acres, equal to 151 square miles, have been selected as reserves. As they have not as yet been gazetted, the detailed description will be recorded in next year's report. In the meantime the following few notes may be of interest.

Linear valuation surveys, extending over a total length of 154 miles, and equal to an area of 1,864 acres, have been made, which gave the following average growing stock of material in the forests per acre:—

	Sál.	Persar.	Asan.	Kusum.	Mahwa.	Kahua.	Kiem.	Thanta.	Sida.	Gamhar.
Seedlings (under 1'6" girth)	32·70	0·88	7·00	0·41	1·02	0·003	4·54	9·77	3·89	0·19
Saplings (1'6" to 3' girth)	1·15	1·26	1·12	0·18	0·47	0 002	0·52	1·71	0·26	0·13
Young trees (3' to 4'6" girth)	0·40	0·26	0·35	0·08	0·23	0·003	0·08	0·36	0·03	0·04
Trees (4' 6" to 6' girth)	0·20	0·18	0·16	0·04	0·11	0·0005	0·03	0·10	0·005	0·008
Old trees (above 6' girth)	0·10	0·08	0·08	0 02	0·04	0·003	0·004	0·01	...	....
Total ...	34·55	2·66	8·71	0·73	1·87	0·01	5·174	11·95	4·185	0·368

On these data a working plan will now be based, which, as stated above, will appear in next year's report. It will be observed that the forests require chiefly rest to recover from the effects of maltreatment.

SUNDERBUNS DIVISION.

72. A complex of forest situated in the Jessore district, and comprising as much as 885 square miles, have been gazetted as reserved forest by notifications in the *Calcutta Gazette* of—

(1) Notification dated 15th February 1875, published on the 17th February at page 204.

(2) Notification dated 5th April 1875, published on the 7th April 1875 at page 412, modifying the above notification.

1. *Area* = 566,253 acres = 885 square miles.

2. *Boundaries.*—North.—An irregular line starting from the point at which the Sunderbuns forest boundary crosses the Mysaleer khâl on the south of lot No. 216, and then proceeding eastward along the said khal to its junction with the Seepsah river; then southwards along the Seepsah river to the point where it is joined by the Sooturkhalee river; then northwards along the said Sooturkhalee until it joins the Bhuddur river; then southwards along the Bhudder river to the point where it is met by the khal or creek called Loutakhalee in the maps, but locally known as Khajoorbaria khal, and which said khal forms the northern boundary of lot 226 called Kurumjal; then along the south and west banks of the said Loutakhalee creek, or Khajoorbaria khal, to its junction with the Pussur river; then a short distance south along the Pussur river and across it to the Nora Cheela khal, which forms the north boundary of lot No. 240; then along the said Nora Cheela khal to its junction with the Gang or river called Cheela Chandpie; then across the Cheela Chandpie and along the south bank of the Khurma nuddee or river as far east

as its point of junction with the Bhola, which flows on the west of the well-known lots 2, 3, 4, 5, 6, and 7, Khowlea Barisal.

East.—The Bhola river, the Bogee khal, and the Hooringottah river.

South.—An irregular line commencing at the point on the east bank of the Arpangassya river, where the creek called the Taul Dooanea, on the north of lot 201, joins it; and then proceeding eastward along the said Taul Dooanea to its junction with the Phool Mollinchew river; then a short distance south along the Phool Mollinchew river to the point at which the creek, named "Pant Kussa" in the maps, but locally known as Pat Koshta, joins it; then south-eastward along the said "Pant Kussa," or Pat Koshta, khal or creek to the river which flows between lots 194 and 199, not named in the maps, but evidently a continuation of the Seepsah river; then across it to the creek, not named in the maps, but which flows between lots 192 and 194, and which, commencing from a point nearly opposite the east extremity of the creek called "Pant Kussa" or Pat Koshta, falls into the Morzal river, close to its junction with the Pussur river; then across the Morzal to the Pussur river, and a short distance southward along the Pussur river to its junction with the Bangarah river; then southward along the Bangarah river to the point at which it flows into the Bay of Bengal, and the Bay of Bengal between the Bangarah and Hooringottah rivers.

West.—The Arpangassya river from its junction with the creek called Taul Dooanea, on the north of lot 201 northwards as far as the khal called Gol Khallee on the south of lot 211; then east along the said Gol Khallee to the Shakbaria river; then northwards along the Shakbaria river as far north as the point at which it joins the Coyra nuddy or river; then south, north, and eastward along the bends of the said Coyra nuddy or river to a khal or creek not named in the maps, but which said khal flows in a north and south direction, the north end joining the Mysaleer khal near the point at which the said Mysaleer khal is crossed by the boundary line of the Sunderbun forest, and the south end flowing into that bend of the Coyra nuddy or river which flows on the extreme north of lot 213.

3. *Topographical description.*—Low islands, partly below ordinary high-water mark, partly above it up to two feet, intersected by numerous rivers and channels, from a few feet up to several miles broad.

4. *Soil.*—Alluvial deposit of a light nature, generally sand and loam mixed in different proportions; occasionally also with clay, and covered with large quantities of vegetable mould. The soil is fertile, but owing to the inundations by salt water it is adapted for certain kinds of vegetation only.

5. *Description of Forest.*—All sunder forests. For details see paragraphs 34 to 39 of this report.

6. *Timber-depôts.*—None at present.

7. *Timber-markets.*—The towns and villages in the 24-Pergunnahs, Jessore, Backergunge, and adjoining districts.

8. *Lines of Export.*—Every navigable river and nullah that leads from the reserve towards the districts mentioned above.

9. *Villages within the reserve.*—None.

10. *Rights of surrounding population.*—None.

11. A map on a scale of four miles equal to one inch is available.

12. *Working Plan.*—Now under consideration: it will be recorded in next year's report.

73. Proposals for an additional reserve adjoining the above, and extending over an area of 201,165 acres, are now before Government.

CHITTAGONG DIVISION.

74. Two reserves have been gazetted during the year,—the Myani timber reserve, equal 339 square miles, and the Kurnafuli plantation reserve, equal to eight square miles: total equal to 347 square miles. Gazetted in notification dated 23rd March 1875, published in the *Calcutta Gazette* of the 24th March 1875, at page 335.

MYANI RESERVE.

75. 1. *Area* (estimated) 217,000 acres, equal to 339 square miles.

2. *Boundaries.*—North.—Hill Tipperah.

East.—The watershed between the Myani and Kassalong rivers.

West.—The watershed between the Myani and Chingri rivers.

South.—A demarcated line from the mouth of the Myani, east and west, to the eastern and western boundary.

3. *Topographical description.*—The reserve comprises exactly the area drained by the Myani river, or a strip of land about 50 miles long and 7 miles broad. The northern, eastern, and western boundaries, are low watersheds, rising to about 1,500 feet above the sea, whereas the Myani traverses the part north to south. Numerous spurs run from the eastern and western boundary to the Myani, so that the reserve consists of undulating ground, with small pieces of level and low ground near the water-courses.

4. *Soil.*—The rock is sandstone, of a soft permeable description, and the soil is sandy loam on all undulating ground, with clay in some of the level parts.

5. *Description of Forest.*—The forest on the undulating ground is all "hill or bamboo forest," and on the low ground partly evergreen plain forest and partly savannah, as described in paragraphs 48, 52, 53, and 54 of this report.

6. *Timber-depôts.*—None as yet.

7. *Timber-markets.*—The Chittagong Regulation district, in particular that part which is traversed by the Kurnafuli; also parts of Noakholly.

8. *Lines of export.*—Down the Myani to the Kassalong and the Kurnafuli.

9. *Villages within the reserve.*—There are at present five small villages in the reserve, the inhabitants of which carry on jum cultivation. They have received intimation that they will have to leave the reserve within two years from the date on which the reserve was gazetted, compensation being given to them to defray the cost of moving, if considered called for.

10. *Rights of surrounding population.*—None.

11. A *map* on a scale of 4 miles equal 1 inch only is available.

12. *Working Plan.*—This can only be prepared after further investigation and survey. In the meantime juming and the preparation of dug-outs will be strictly prohibited.

KURNAFULI PLANTATION RESERVES.

76. This reserve is to comprise an area of 5,000 acres, on which teak and other trees are to be raised. A detailed survey will be made during the coming cold season, so that it will be preferable to give the record of the reserve in next year's report.

77. Since the close of the year an additional reserve on the Martamori river, comprising an area of 223 square miles, has been gazetted, a detailed description of which will be found in next year's report.

SECTION III.—PROTECTION AND IMPROVEMENT OF FORESTS.

ESTABLISHMENTS.

78. Changes were made during the year in the head office, and in the Darjeeling and Julpigoree Divisions.

CONSERVATOR'S OFFICE.

Consequent on the separation of Assam from Bengal, the work in the Conservator's Office was considerably reduced, and a reduction of establishment called for. The following proposals were submitted, and sanctioned by Government, thereby effecting a saving of Rs. 170 per month.

OLD ESTABLISHMENT.

Accounts Department.

	Rs.
1 Examiner of Accounts	250
1 Accountant	75

Correspondence Department.

1 Head Clerk	125
1 2nd „	50
1 3rd „	30
1 Orderly-peon	8
2 Office-peons, at Rs. 7 each	14
1 Sweeper	3
Total ...	555

NEW ESTABLISHMENT.

Accounts Department.

1 Accountant	125

Correspondence Department.

1 Head Clerk	125
1 2nd „	50
1 Draftsman	60
1 Orderly-peon	8
2 Office-peons, at Rs. 7 each	14
1 Sweeper	3
Total ...	385

DARJEELING AND JULPIGOREE DIVISIONS.

79. The following statement shows the change:—

OLD ESTABLISHMENT, COOCH BEHAR DIVISION.

Office Establishment.

	Rs.	Rs.
1 Clerk	70	
1 Office-peon	6	
Total ...	76	
		76

Protective Establishment.

1 Forest-ranger	50	
1 Forester	20	
2 Ditto, at Rs. 14 each	28	
8 Watchers, „ 7 „	56	
Total ...	154	
		154
GRAND TOTAL		230

NEW ESTABLISHMENT, DARJEELING DIVISION.

Office Establishment.

1 Clerk	70	
1 Office-peon	6	
2 Orderly-peons, at Rs. 7 each	14	
Total ...	90	
		90

Protective Establishment.

				Rs.	Rs.	Rs.
1	Forester	...	...	40		
2	Ditto, at Rs. 30 each	...	...	60		
3	Ditto „ 20 „	...	...	60		
5	Peons „ 7 „	...	...	35		
17	Watchers „ 8 „	...	...	136		
		Total	...	331		
					331	
		Total	...	...	421	
						421

JULPIGOREE DIVISION.

Office Establishment.

1	Clerk ...	...	...	60		
1	Office-peon ...	...	...	6		
1	Orderly-peon ...	...	...	7		
		Total	...	73		
					73	

Protective Establishment.

1	Forest-ranger ...	...	...	50		
1	Forester ...	...	...	30		
1	Ditto ...	...	...	20		
1	Depôt-munshi ...	...	...	20		
3	Peons, at Rs. 7 each	...	...	21		
14	Watchers „ 8 „	...	...	112		
		Total	...	253		
					253	
						326
		Grand Total	...		...	747

The increase of expenditure amounts to Rs. 517 per month, which is a large sum; but then it should be remembered that the old scale of protective establishment, comprising one ranger, three foresters, and eight watchers, for a forest area of 449 square miles scattered over more than 2,000 square miles, was simply useless, or even worse, because a system of conservancy only attempted, and not carried out effectively, has always a bad moral effect upon the people. With the new establishment it has been possible to protect the Government property really and truly, and not only on paper. New areas are, however, being taken up rapidly, and consequently additional establishments must be entertained at the same rate.

FOREST LAW.

80. During the year difficulties in the collection of the forest-tolls in Chittagong were experienced, and it is intended to introduce a special short Act to legalize the collection of tolls. The draft is now with the Commissioner of Chittagong for an expression of his opinion. It is to be hoped that the Act will be passed soon, or else the revenue will suffer.

BREACH OF FOREST RULES.

DARJEELING DIVISION.

81. Thirteen cases, in which thirty persons were involved, have been brought before the courts. Out of these ten convictions were obtained, and one case is pending. Twenty-four persons were convicted to undergo imprisonment or to pay fines, and one is under trial.

The case against Nakul Sing, who cut 100 sâl-trees illicitly in the Sukna forest, as mentioned in last year's report, is still pending.

In several cases the defendants were men in the employ of tea-planters, who cut wood chiefly for charcoal in the Government forests; and in one instance the sirdar of the men offered a bribe to the forester. He was put into prison for six months, and his coolies for two months each.

A man who set the Sukna forest on fire received three months' imprisonment.

Baboo Nitai Chunder Kundu, a forester of the Department, was prosecuted for misappropriation of Government money. He was punished by two years' imprisonment, against which sentence he appealed, but the appeal was dismissed.

JULPIGOREE DIVISION.

82. The number of prosecutions is six, in which twelve persons were defendants. Four convictions were obtained, and one case is pending. The number of persons convicted amounts to seven, whereas three are under trial. The following are the successful cases:—

(*a*).—Three men cut and removed nineteen green sissu-trees.—Rigorous imprisonment for one month each. Trees seized.

(*b*).—Two men stole a kala khamba.—Fined Rs. 2 each.

(*c*).—One man cut and removed one green sissu-tree.—Whipping of twenty stripes. Tree seized.

(*d*).—One man removed a sâl log from the Aliporo depôt without authority.—Three months' imprisonment and fine of Rs. 25. Log to be replaced in the depôt.

83. The above convictions have all been obtained under the provisions of the Indian Penal Code, and not under the Bengal Forest Rules of 1871; because in the former case punishment is awarded in addition to the restoration of the timber or other forest produce, whereas in the case of prosecutions under the Forest Rules no punishment could be given in addition to the confiscation of the stolen property, and the people would not care whether they were caught or not. Hence the Forest Act, and consequently the Forest Rules, are not only useless, but actually objectionable in this respect. The only good derived from their existence in Bengal is that they have led to the formation of reserved or State forests, for the setting aside of which they provide.

DEMARCATION OF BOUNDARIES.

DARJEELING DIVISION.

84. The reserves having been gazetted in an off-hand way, and many of the boundaries never laid down on the ground, great uncertainty exists regarding them, so much so that in many cases only a new survey will be the method of settling existing disputes. A few of the disputed boundaries have been settled during the year, and measures to settle the rest are now under discussion. As the settlement proceeds, the reserves will have to be re-gazetted under the Bengal Forest Rules of 1871.

JULPIGOREE DIVISION.

85. The southern boundary of the Buxa reserve, from the Cheko nuddy on the east to the Poroh on the west, a distance of 7¼ miles, has been cut and demarcated with 97 wooden posts, 20 feet in height, each surrounded with a mound of 10 feet in height by 10 feet in diameter at the base. At the four most important points masonry pillars will be erected during this year, and the demarcation of the remaining boundaries proceeded with.

FIRE SUPPRESSION.

DARJEELING DIVISION.

86. With the exception of the Bamunpokri plantation, which was successfully protected at a cost of Rs. 79-11-6, no expenditure has been incurred during the year in protecting the forests of the division against fire. In the hills, except those adjoining the Terai, fires are almost unknown; and in the Terai and lower hills they were very few during the year, only four blocks having been burnt. This is explained by the following facts:—

(*a.*)—A good amount of rain fell early in the season, which kept the grass too green and moist to catch fire.

(*b*).—Better supervision in consequence of better establishments.

(*c*).—Greater care on the part of the villagers living near the forests, who know that they will be put into court if they fire the forests. In this matter the Assistant Conservator in charge has been cordially assisted by Mr. Edgar, C.S.I., the Deputy Commissioner of the district.

(*d*).—In the case of Sivoke the prevention of cattle grazing has much helped to protect it against fire.

Judging from this year's experience, the Conservator has no doubt that the greater portion of the forests in the division can be protected against fire without the cutting of fire-paths.

JULPIGOREE DIVISION.

87. In this division, too, rain fell early in the season, and jungle-fires were less frequent than usual.

The Muraghat reserve, comprising an area of 10,920 acres, is bounded by rivers on three sides; only on the northern boundary a fire-path was burnt at an expenditure of Rs 63. The reserve was thus successfully protected, with the exception of 200 acres, which were set fire to by shikaries. The villagers in the neighbourhood, however, turned out and extinguished the fire before it could spread. The shikaries were not punished, as no direct proof that they were the perpetrators was forthcoming. Their guns were confiscated by the Deputy Commissioner of the district, as licenses had not been granted to the men.

CHITTAGONG DIVISION.

88. Only the Kurnafuli teak plantation, comprising an area of 146 acres, has been protected against fire.

CREEPER CUTTING.

DARJEELING DIVISION.

89. The creepers on all valuable trees in the Sivoke sâl forest, equal 1,553 acres, have been cut during the year, with the exception of a small piece. The work could not be completed, as the coolies would not stop longer, owing to some cases of severe illness. This forest will be completed and another block taken in hand during the year 1875-76.

JULPIGOREE DIVISION.

90. One compartment in the Buxa forest, containing 439 acres of sâl, has been cleared of creepers and useless trees, and several other compartments will be taken in hand during 1875-76.

ROADS AND BUILDINGS.

DARJEELING DIVISION.

91. The existing forest roads in the Terai, about 21 miles in length, have been cleared during the year, and a new fair-weather road from Sukna to the Champasari river has been laid out.

92. The two bungalows at Silligoree, not being required for the Department, have been made over to the Commissioner of Cooch Behar by the orders of Government. The Rungbul rest-house and part of the Sivoke bungalow have been repaired during the year. A rest-house was built at Bamunpokri at a cost of Rs. 103-13. Four foresters and fifteen watchers were provided with huts in or adjoining their beats.

JULPIGOREE DIVISION.

93. A system of rough roads has been commenced in the Buxa reserve. They are 15 feet broad, and one mile distant from each other. Three of these roads have been opened out during the year in the Rajahbatkaua block, running due east and west from the Balla nuddy on the east to the Dima nuddy on the west, traversing the Cooch Behar–Buxa military road at the 29th, 28th, and 27th mile-posts. The dimensions are as follows:—

	Miles.	Furlongs.	Poles.
29th mile forest road...	3	0	24
28th „ „	2	4	9
27th „ „	3	1	21
Total ...	8	6	14

or eight and three-fourth miles in a round figure.

94. A cheap inspection bungalow has been built at Rajahbatkaua, in the Buxa reserve, and 10 forest huts for subordinates have been erected in different parts of the forests.

SECTION IV.—PLANTATIONS.

95. Our plantations are as yet of an experimental character, but in Chittagong we are just about to emerge from the experimental stage, and to set on foot the systematic planting up of a block of 5,000 acres with teak, jarul, and toon.

96. There were 343 acres planted at the beginning of the year, to which 84 acres have been added, bringing the total area at the close of the year up to 427 acres, which cost Rs. 30,826, or at the rate of Rs. 72 per acre.

According to species, we have:—

	Acres.
Plantations of oaks, chestnuts, magnolias, and walnuts ...	144
„ of conifers	42
„ of sweet chestnut	1
„ of teak	149
„ of teak and toon	91
Total ...	427

DARJEELING DIVISION.

97. *Rungbul Plantation.*—This plantation of oaks, chestnuts, magnolias, and walnuts, has been laid out in 1868 to 1871. Its area was given as 450 acres; but doubts as to the correctness of this figure having arisen, a survey was made during the year, which showed the area to amount to 144 acres only. During the year the plantation has been fenced in, as cattle could not be kept out. It has also been divided into four compartments by narrow roads, as follows:—

	Acres.
Compartment 1	24
„ 2	28
„ 3	31
„ 4	61
Total ...	144

There are numerous vacancies in the plantation, and in order to fill these up 18 maunds of walnut, oak, magnolia, chestnut, and cryptomeria-seed, have been sown in the Rungbul nursery. These have germinated well, and since the close of the year compartments one and two have been interplanted with walnut-seedlings 30 feet apart. Compartments three and four will be planted up during the current year. The former two compartments have also been cleared of brambles, and the old plants have been pruned. The erection of the fence had a very beneficial effect, as all the old plants have made a fresh and vigorous start since cattle have been kept out.

98. Nothing has been done in the *Dhobie Jhora* pine plantation, except protecting it.

99. *Bamunpokri Plantation—Teak and Toon.*—With last year's report a plan of operation was given, according to which no extension was contemplated in 1874-75 in order to fill up the area, 91 acres, already taken in hand. This has been done under the Conservator's personal supervision. The area is now sufficiently stocked with teak and toon alternately. The cost of keeping down the grass has been enormous; but unless the ground is kept clear, it will be impossible to raise either teak or toon in the Darjeeling terai.

100. Towards the end of the year the areas to be planted in 1875-76 have been cleared, and since the close of the year compartment I 2-C, equal 19 acres, has been planted out with teak and toon, as laid down in the general plan of operations, whereas compartment I 3 B, equal 25 acres, is being planted out now. The growth of teak during the year has been hardly more favourable than in former years, and several years more will have to elapse before a final conclusion regarding the ultimate results can be arrived at. Toon grows very freely, but the grub of a beetle has done a good deal of damage by entering and hollowing out the top shoots of the young trees. These had to be cut back, and side shoots are now taking the lead. Many of the teak-plants have been pruned during the year.

101. *Mahogany.*—An additional 50 mahogany-seedlings received from Dr. King have been planted out. The older plants, now three years old, have commenced to show a tendency towards growing bushy. They have all been carefully pruned, and this will be continued until the plantation closes up.

102. *Baobab.*—The plants remaining at the end of 1873-74 have all died during the year. They were carefully fenced in, and the Conservator is unable to offer an explanation, except that the climate may be unsuitable.

103. *India-rubber.*—Of the little plantation described in paragraphs 107 and 108 of last year's report, only two seedlings are left, and these have made slow progress.

A large number of *ficus elastica* seedlings have been raised, which, when of sufficient size, will be planted out, partly on trees and partly in the ground. The seeds sown have germinated freely, and little or no difficulty has been experienced so far in raising the seedlings. The experiment will be carefully watched, with a view to determining whether plantations of this tree on a large scale should be formed or not.

104. *Rungirum. Sweet chestnuts.*—Several boxes of seed were received from England, but most of the seed was found to be bad on opening the boxes. The seed was, however, sown at Rungirum, and it produced 86 seedlings. These were planted out on a westerly slope below Rungirum, at an elevation of about 5,000 feet. The Conservator inspected the little plantation at the close of the year, when he found 70 alive and thriving, the rest having died. They are planted 30 feet apart, and it is proposed to interplant the area with hill toon.

An additional supply of seed was received during the year, but it was in a very bad condition, and only a few seedlings have sprung up as yet.

CHITTAGONG DIVISION.

105. Since the year 1871 several experimental plantations of teak have been formed in this division. These were visited during the year by the Conservator of Forests, who offers the following remarks regarding them.

106. It has been ascertained that indigenous teak is found in India as far north as latitude 25°30′, that it thrives best under a mean annual rainfall of 50 to 120 inches, and in localities with a mean temperature—

in the cold season of	60°	80°
„ hot „	80	85
„ rains of	77	87
„ autumn	71	81
Annual mean	72	82

It is further known that in Burmah teak thrives best on the sandstone of the Pegu Joma. (*See* Brandis' Forest Flora of North-West and Central India.) In order to see whether the climate of Chittagong suits teak, the following data have been extracted from the meteorological report of Bengal for 1874. The only complete data available are those for the station of Chittagong, situated in 22°21′ latitude. There we have a rainfall of 103 inches, calculated from 15 years' observations. The temperature stands as follows, average of 7 years:—

Cold season	70·5
Hot season	80·8
Rains	81·4
Autumn	80·8
Annual mean	77·5

Hence Chittagong may be said to be situated in a climate suitable for teak as far as latitude, rainfall, and temperature go.

107. The practical results of planting may be described in the following manner:—

The first attempt was made by planting five acres close to the station of Chittagong, at a place called Pahartulli. The site consists of slightly undulating ground, with a soil of stiff clay, which becomes thoroughly baked in the dry season. The seed was sown at stakes in the beginning of the rains of 1871, and vacancies were filled up from a small nursery. Now the tallest plants are under 10 feet high, and most of them only between one and two feet. The growth is evidently stunted; the lower part of the stem is bottle-shaped, and in the upper parts the several sets of leaves almost touch each other, so close are they together,—evident signs that the locality is not suited for the growth of teak.

108. In the station of Chittagong a number of teak-trees have been planted in former years, but as the soil is not adapted for the species, the stems produced are of inferior shape, fluted, and short.

109. The idea of planting teak close to the station of Chittagong having been abandoned, two pieces of land at Sitapahar and Holingamara were selected for further experiments. These localities are situated on the Kurnafuli river, and they have both been included in the Kurnafuli reserve, about 25 miles east by north-east from Chittagong. There are no meteorological data available for the reserve, but from general observations it is evident that the temperature is pretty much the same as that at Chittagong. At the latter station the rainfall is 103 inches per year, and at Rangamatia it amounts to 90 inches; consequently the rainfall in the reserve, which is situated between the two, but nearer to Rangamatia, may be set down as about 95 inches. On the whole, therefore, latitude, temperature, and rainfall in the reserve, are well suited to the growth of teak. Moreover, the prevailing rock is a permeable sandstone, similar to that found in most parts of the Pegu Jomah.

110. The formation of the surface is also favourable, as it consists of undulating ground rising from 100 feet above the sea to 1,100 feet. Some of the hills are steep, others have gentle slopes, and here and there small patches of level ground are found along the water-courses.

111. The soil consists of sand and loam mixed in different proportions, mostly light and fairly fertile, in many instances very fertile.

112. Originally these hills were all covered with forest, but jooming has reduced it to jungle of bamboos, tall grasses (sun-grass), with seedlings and single trees here and there, and patches of the original forest in steep places. The trees found in this forest are those of the hill or bamboo forest, described in Section I of this Report as—

Koroi	...	... *Albizzia procera.*
Dharmara	...	... *Stereospermum chelonioides.*
Udal	...	... *Hibiscus macrophyllus.*
Gamhar	...	... *Gmelina arborea.*
Simul	...	... *Bombax Malabaricum.*
Chaplis	...	... *Artocarpus chaplasha.*
Jarul	...	... *Lagerstroemia Reginæ.*
Chikarassi	...	... *Chikrassia labularis*, and others.

113. The following areas have been planted:—

	Acres.
In 1871-1872	8
„ 1873-1874	50
„ 1874-1875	83
Total ...	141

In 1871-72 and 1872-73 the seed was put down at stakes six feet by six feet, but it failed extensively, and the vacancies had to be filled up with transplants. In the years 1873-74 and 1874-75 all seed was sown in nurseries, and the plantation formed with transplants. The teak has grown very luxuriantly, the seedlings of 1871-72 being now up to 30 feet high, those of 1872-73 up to 20 feet, and the seedlings of 1873-74 range from two feet up to 12 feet. Those kept clear of grass and jungle are large and strong, whereas those which have suffered from grass are thin, weedy, and small. The seedlings of 1874-75 look strong and healthy, and are up to three feet high wherever they have been kept clear of grass and jungle; but they are small and weedy where they had to struggle against the growth of grass. The greater part of the plantation is well and fairly stocked, six feet by six feet, but in some parts plants have evidently been killed by dense jungle.

114. Hitherto the Assistant Conservator had very up-hill work in procuring labour, and so much so that it is now intended to import 80 dhangar coolies for plantation work.

115. In future the ground must be kept clear during the two first years at any rate, and perhaps also the third. Instead of six feet by six feet, it is intended to plant five feet by five feet, so as to cause the plantation to close up sooner. Teak is to be mixed with other woods, as toon and jarul.

116. A grub has done a good deal of damage. It enters the young tree below four feet from the ground, usually at a knot, but not always; eats round the tree between bark and wood, then into the pith, and up and down the pith for not more than one foot in each direction. Fortunately the Conservator found on examination that most of the trees fill up the part eaten away between bark and wood by fresh layers of sapwood. Trees thus attacked are liable to fall down, and if so, a new shoot comes up from the stock. Many grow on; but where the insect was at work a swelling takes places, which appears to be due to an effort on the part of the tree to fill the passage of the insect between bark and wood up again. The insect should be closely watched. The Conservator does not think at present that it will prevent our growing very fair teak in the locality.

117. On the whole it must be said that teak thrives much better in the Kurnafuli reserve than in any other part of Bengal where it has been tried, and plantations on a fair scale should be established in a systematic way.

118. Forest produce commands such high prices in Chittagong that if we grow nothing but saplings fit for house-posts, the plantation would pay: in other words, thinnings will be saleable at fair and even high rates, which is not always the case with Indian timber plantations.

119. During the approaching cold season a detailed survey of the reserve will be made, and a plan of operations, similar to that for the Bamunpokri plantation published with last year's report, drawn up.

120. The expenditure on the Chittagong plantations so far stands as follows: Total Rs. 5,985-5-5 for 146 acres, or at the rate of Rs. 41 per acre.

SECTION V.—YIELD OF THE FORESTS.

121. In last year's report the Conservator drew attention to the fact that for a number of years past a large quantity of timber and sleepers have been borne on the books as lying in depôts, whereas in reality they are lying scattered over the forests. The Government have taken up this subject, and issued orders that only timber actually lying in sale-depôts should be borne on the books, and that the rest should be struck off from the 1st April 1874. These orders have been carried out, and consequently the opening balance shown in form 25 for the year 1874-75 does not agree with the closing balance shown in form 25 for 1873-74. The so-called forest-depôts have all been struck off, and the difference in the station or sale-depôts is exhibited in the following table:—

	Pieces.
Shown at end of 1873-74 in the Cooch Behar division ...	16,691
Ditto at the beginning of 1874-75 in the Darjeeling and Julpigoree divisions	16,461
Difference ...	230
Add number of pieces struck off as lying in so-called forest-depôts	15,272
Total number taken off the books ...	15,502

Of these, about 4,200 are logs, and the rest chiefly railway-sleepers.

DARJEELING DIVISION.

122. During the year the following timber has been brought to depôt:—

Description of timber.	Pieces.	Cubic feet.
Sâl logs	126	4,064
Sissu „	503	4,185
Miscellaneous logs	16	681
Total logs ...	645	8,930
Broad gauge sleepers	4,132	13,763
Narrow ditto	8,572	11,430
Total sleepers ...	12,704	25,193
Planks and scantlings	179	681
Kala khambas	3	...
GRAND TOTAL ...	13,531	34,804

In addition to the above, 179 sâl logs = 3,673 cubic feet, and 20 sleepers = 67 cubic feet, were transported from the Sivoke to the Julpigoree depôt.

123. The broad gauge sleepers, planks, and scantlings, have all been cut in former years. They had to be searched for all over the Terai and lower hill forests, and they were partly carried and partly carted to depôt. The narrow gauge sleepers have all been cut during the year out of old logs lying about the forests.

The sâl logs are all old cut logs, and the sissu logs were those knocked down by heavy floods. They were dragged and carted from the rivers to the depôts.

The sleepers have been cut and collected for the Northern Bengal State Railway.

124. Thirty-one logs of sâl were floated during the year from the Upper Teesta to Sivoke. Of these, only three were lost in transit, but two afterwards recovered, so that no difficulty has been experienced in using the Teesta above Sivoke for floating. All the remaining old timber will now be brought to depôt in the same manner.

125. The sales effected during the year comprise the following pieces:—

Description of Timber.	Pieces.	Cubic feet.	Average amount realized.
			Rs. A. P.
Sâl logs	254	6,902	1 1 0 per cubic foot.
Sissu „	3	33	1 0 0 „ „
Toon „	2	98	1 8 0 „ „
Upper hill timber	55	2,230	0 0 4 „ „
Total logs	314	9,263	
Broad gauge sleepers	10,540	35,133	1 11 6 each sleeper.
Narrow ditto	2,968	3,957	1 12 0 „ „
Total sleepers	13,508	39,090	
Planks and scantlings	201	454	
Kala khambas	10	112	
Grand Total	14,033	48,919	

The sâl-timber has been sold partly to the Civil Public Works Department and partly to the Northern Bengal State Railway. Fifty-five old logs of oak and chestnut were sold by public auction from the Rungbul depôt, for which only four pie per cubic foot was realized. The remaining timber is unsaleable altogether, and arrangements have been made to cut it up into firewood.

126. The Northern Bengal State Railway took over the narrow gauge (new) sleepers at Re. 1-12-0 each, and the old broad gauge sleepers partly at Rs. 2-4 and partly at Re. 1-12-0. The rejections of old sleepers were sold by auction, and as they fetched only very low prices, thus brought the average down to Re. 1-11-6 per sleeper.

127. The old sleepers must be sold for what they will fetch. The cost of cutting and bringing to depôt 8,934 new narrow gauge sleepers amounted to Rs. 3,815-6-0, or six annas ten pie per sleeper. Allowing ten per cent. for rejections by the railway authorities, or 8,041 sleepers made over, equal to Rs. 14,071, and considering that 18,460 cubic feet of timber were expended in preparing the sleepers, it follows that nearly 12 annas for each cubic foot of timber have been realized. This must be considered a very fair amount, considering that only such logs are cut up into sleepers as are inaccessible for elephants.

128. In order to test the value of other timbers for railway-sleepers, small quantities of the following species have been cut under agreement with the Engineer-in-Chief, Northern Bengal State Railway:—

Saj	... *Terminalia tomentosa.*
Chilauni	... *Schima Wallichii.*
Sida	... *Lagerstroemia parviflora.*
Khair	... *Acacia Catechu.*
Jamun	... *Eugenia Jambolena.*
Kumbi	... *Careya arborea.*
Harra	... *Terminalia Chebula.*
Bahura	... *Terminalia Belerica.*

On the whole, good progress has been made during the year to bring the old stock to depôt, and the current year may see us conclude this unsatisfactory work.

129. The financial results of the timber operations in this division stand as follows:—

	Rs.	A.	P.
Average receipts per cubic foot	0	11	0
„ expenditure per cubic foot, including share of establishments, &c.	0	5	2
Surplus per cubic foot ...	0	5	10

This is not unfavourable, considering that more than half of the timber consisted of old broad gauge sleepers, and that the best of the timber has been cut years ago.

130. The quantity of timber removed from the forests *by private parties* is shown in the subjoined form:—

Description.	Number.	Amount realized or due.	Average amount of each.	Remarks.
		Rs. A. P.	Rs. A. P.	
Akrot, green	2	49 0 0	24 8 0	
Champ „	26	632 0 0	24 13 1	
„ dry	1	7 2 0	7 2 0	38 cubic feet.
Toon, green	51	960 0 0	19 3 5	
„ dry	7	84 0 0	12 0 0	
Sál, green	730	10,310 0 0	14 1 11	
„ dry	6	30 0 0	5 0 0	
„ kala khambas	123	63 0 0	0 8 2	
Sissu, green	44	520 0 0	11 13 1	
„ dry	22	30 0 0	1 5 9	
Booke, green	127	1,520 0 0	11 15 7	
Phalat „	5	60 0 0	12 0 0	
Katoos „	46	546 0 0	11 13 11	
„ dry	1	2 2 6	2 2 6	23
Pipli, green	39	468 0 0	12 0 0	
Saj „	7	70 0 0	10 0 0	
Chilauni (plains), green	67	670 0 0	10 0 0	
Ditto (hills) „	1	10 0 0	10 0 0	
Panisaj, green	16	136 0 0	8 8 0	
Goguldhup „	32	312 0 0	9 12 0	
Lali „	41	328 0 0	8 0 0	
Lowest price: Lamputtia, green	23	138 0 0		
Simul „	5	30 0 0		
Parari „	1	6 0 0		
Boeri „	1	6 0 0		
Kabaahi „	4	24 0 0	6 0 0	
Mahua „	7	42 0 0		
Lepchaphul „	1	6 0 0		
Dandri „	1	6 0 0		
Other kinds „	126	756 0 0		
Firewood (Hills)	809	809 0 0	1 0 0	Tickets.
Ditto (Terai)	350	10 8 0	3 0 0	Maunds per 100 maunds.
Charcoal	6	12 0 0	2 0 0	Tickets.
Drift timber.				
Sissu logs	34	46 0 0	1 5 8	
Panisaj „	2	15 0 0	7 8 0	
Lamputtia „	2	15 0 0	7 8 0	
Bahura „	1	8 0 0	8 0 0	
Total	.....	18,756 12 6		
Deduct— Amount due, but not realized	.....	4 4 0		
Total amount shown as revenue under 1, 2, and 3	.....	18,752 8 6		

131. Several kinds of timber not used formerly are now sought after especially Pipli (*Bucklandia populifolia*). With the increasing demand, especially for tea manufacture, and with the decrease of the supply from private lands, there can be no doubt that very soon every stick available from the forests will find a ready purchaser.

132. A beginning has been made to utilize the drift timber found in the different rivers, especially the Balasun and Mechi: 1,030 logs, many of which are sissu and toon, have been saved from the former during the year, and are now being carted to a new dedôt on the Siligori–Punkabari road, where it crosses the Rakti river. Another new depôt at Naksulbarry is now being laid out, in which the drift timber from the Mechi will be collected. Twenty-one drift sissu logs were brought from the Mahanuddy to the Sukna depôt, and several other logs were recovered from the Teesta and brought to the Julpigoree depôt.

133. Hitherto the Department has been occupied in this division with bringing to depôt and selling the old timber lying about the forests. As soon as that work has been completed, the Terai and lower hill forests will be worked chiefly by departmental agency, and it is to be hoped that the upper hill forests may hereafter be worked on the same system, as under existing circumstances this method is the only one likely to produce the greatest possible yield, and to prevent waste of material.

134. *India-rubber.*—Owing to former heavy tapping, the rubber-trees in the Sivoke hill forest were strictly protected during the year, and the trees in other forests were found to be so reduced that scarcely any would yield rubber, the total collections amounting to 20 maunds and 18 seers. Hence not less than

three years' rest should be given to the trees, during which no tapping whatever will be done.

135. *Other minor forest produce.*—Fifty-eight thousand three hundred and thirty bamboos were sold for Rs. 585. In addition, the permits to cut Malingo bamboos from the Gumpahar, Senchal, and Mahalderam forests, produced Rs. 140. As cattle-grazing is not encouraged, the revenue realized amounts to Rs. 1,799 only. For the permits of other minor forest produce Rs. 245 have been realized.

JULPIGOREE DIVISION.

136. With the exception of dry and fallen, and a few stray green trees, the timber operations in this division are conducted by departmental agency. For the present the working of the Buxa plain forest has been taken in hand. The following table shows the timber brought to depôt:—

Description of timber	Pieces.	Cubic feet.
Sâl logs	690	16,825
Toon „	3	93
Total logs ...	693	16,918
Broad gauge sâl-sleepers	651	2,114
Planks and scantlings	83	91
Kala khambas	79	393
Ditto	92	?
GRAND TOTAL ...	1,598	19,516

In addition to the above, 254 sâl logs, measuring 8,451 cubic feet, have been dragged from the Buxa reserve to the Cooch Behar–Alipore cart-road.

137. Regarding the work in the Buxa reserve, the following extract from Mr. Home's report, the Deputy Conservator of Forests in charge of the division, deserves a place here:—

"All sâl-trees of five feet girth and upwards, measured at four feet from the ground, and fit to yield marketable timber, in the compartment of the Buxa reserve, between 27th and 28th mile forest-roads, were felled. The outturn was 495 trees, which gave 717 logs with an average of 30·4 cubic feet per log. All these trees are within a mile of the Alipore–Buxa cart-road, there being no full-grown trees in the remaining portion of the compartment, though the ground is all well covered with well-grown young sâl.

138. "Only 254 logs were dragged out of the forest to the Buxa–Alipore cart-road, as but one elephant was available, the other having been able to work but 22 days during the season, owing to bad sores on his hind feet, which are, however, gradually healing. The contractors carted 652 logs (old) from the Buxa–Alipore cart-road to the Alipore depôt, and there are 171 old and 136 new logs left on the road ready to be carted next season. The whereabouts of over 500 more old logs in the forest are known.

139. "The system adopted in carting and in the management of the Alipore depôt is as follows. The carting contractors have the option of taking what logs they prefer from the Buxa–Alipore road. The timber, on arrival in depôt, is taken over by the munshi in charge, who points out the line in which the log is to be placed. The arrangement of the timber in depôt is in lots of five first or ten second class logs, separated by a space of three feet between each lot, and the lines are placed at regular intervals of eight feet apart to allow of the carts passing between them. The munshi has been supplied with bound receipt-books, in which the receipt-forms are printed with counterfoils, and on arrival of a batch of carts the logs are measured, numbered, and entered in the depôt-register, and a receipt showing the number and measurements of the logs received daily given to each contractor. The forest-ranger settles the carting accounts twice a month at the Alipore depôt, when the contractors deliver him the receipts received from the munshi (which he compares with the counterfoils, and with the entries in the depôt-register), and forwards them to the divisional office with the vouchers in support of the entries in his cash-book. The logs

are marked with the department "F.D." hammers when they are brought out of the forest on to the cart-road, and the following information is stamped along each log with steel numbering dies by the munshi on arrival in depôt:—

1st.—"Year of receipt; 2nd, current register number; 3rd, length of log; 4th, mean girth; 5th, cubical contents.

"Thus:—75 192 26′ 9″ 60″ 41·8.

"In this way there is no difficulty in checking the measurements of the logs at any time, and intending purchasers can at once examine the timber and obtain a knowledge of the contents of the various lots. A space of 60 feet broad along the bank of the Kalajani river has been marked off and set apart, in which purchasers are allowed to saw up their timber previous to boating or carting it away, and the depôt-munshi examines each log before it is removed into this part of the depôt.

140. "On the 19th March 1875, the date fixed for the annual auction-sale of timber at Alipore depôt, 641 logs, of which 135 logs were second class, were arranged for sale. The auction was, however, a complete failure. No Dacca merchants attended the sale, and all the purchasers being residents of of Cooch Behar, there was very little competition for the lots put up. Hearing, however, that Dhunput Sing, Rai Bahadoor, wished to make large purchases, and that his agent could not be present until 24th March, I postponed the sale to that date. There was still, however, very little competition; he and the Superintendent, Department Public Works, Cooch Behar State, being the only two purchasers to any large amount, and there being more timber than they together wished to take. The men who attended the sale in March 1874 as agents for the Dacca timber-merchants stated that they had received instructions from their principals not to purchase, as last year's stock taken to Dacca had not been disposed of. [This is due to the inferiority of the timber, which is all old, and perhaps partly to the scarcity reigning in Bengal.]

141. "The logs sold by public auction realized as follows:—

	Logs.	C. ft.	Rs. A. P.	Rs. A. P.	
First class ...	55	1,432	765 0 0	0 8 6	per c. ft.
Second class ...	60	928	230 0 0	0 3 11	„ „
Total ...	115	2,360	995 0 0	0 6 9	„ „

"The expenses in bringing this timber to depôt were as follows:—

	Rs. A. P.	
Felling and barking per log	0 8 0	
Dragging, including feed and keep and 10 per cent. of value of elephants	1 6 0	
Total	1 14 0	
Or at the rate of	0 1 1	per c. ft.
Carting	0 3 6	„ „
General expenses	0 0 6	„ „
Total	0 5 1	„ „

"The net surplus is therefore only Rs. 0-1-8 per cubic feet. Other sales (private) were, however, made on the same day, after the auction had been closed, of 265 logs, containing 7,839 cubic feet, which realized Rs. 5,879-8-6, or 12 annas per cubic foot, and these logs were taken consecutively as placed in lots for the auction. The whole day's sales therefore stand as follows:—

	Logs.	C. ft.	Rs. A. P.	Rs. A. P.	
First class ...	320	9,271	6,644 8 6	0 11 6	per c. ft.
Second „ ...	60	928	230 0 0	0 3 11	„ „
Total ...	380	10,199	6,874 8 6	0 10 9	

which leaves a net surplus of Rs. 0-5-8 per cubic foot."

142. The total sales effected during 1874-75 from the depôt stand as follows:—

Description.	Pieces.	Cubic feet.	Average amount realized.
Sâl logs	625	16,908	Re. 0-12-8 per cubic foot.
Kala khambas	140	(?)	„ 1-12-11 each.
	765		

143. The financial results of the timber operations stand as follows:—

	Rs.	A.	P.
Average receipt per cubic foot	0	12	8
Ditto expenditure per cubic foot, including share of establishment, &c.	0	7	6
Surplus per cubic foot	0	5	2

The timber sold is all old, and higher rates are sure to be realized when the new timber will be brought into the market.

144. The subjoined table exhibits the material removed from the forests by private parties:—

Range.	Produce.	Number of trees or pieces.	Amount realized.	Total per range.	Average amount per piece.
			Rs. A. P.	Rs. A. P.	Rs. A. P.
Buxa	Sâl-trees, green	3	30 0 0	.....	10 0 0
	Ditto do.	9	63 0 0	.....	7 0 0
	Chelauni do.	13	130 0 0	.....	10 0 0
	Ditto do.	5	11 4 0	.....	2 4 0
	Champ do.	3	36 0 0	.....	12 0 0
	Ditto do.	18	180 0 0	.....	10 0 0
	Sâl goola	23	81 13 6	.....	3 9 0
	Kala khambas	1	10 0 0	.....	10 0 0
	Ditto	9	63 0 0	.....	7 0 0
	Ditto	334	1,002 0 0	.....	3 0 0
	Ditto	1,987	1,987 0 0	.....	1 0 0
	Ditto	450	225 0 0	.....	0 8 0
	Sissu, dry	10	10 0 0	.....	1 0 0
	Khair „	4	3 0 0	.....	0 12 0
	Other trees	14	7 0 0	.....	0 8 0
	Ditto	86	21 8 0	.....	0 4 0
				3,860 9 6	
Muraghat	Sâl-trees, green	25	175 0 0	175 0 0	7 0 0
Tundu	Kala khambas	14	140 0 0	.....	10 0 0
	Ditto	231	693 0 0	.....	3 0 0
	Ditto	840	840 0 0	.....	1 0 0
	Ditto	628	314 0 0	.....	0 8 0
	Toon, dry	1	15 0 0	.....	15 0 0
	Ditto	2	24 0 0	.....	12 0 0
	Sissu, dry	1	10 0 0	.....	10 0 0
	Ditto	1	8 0 0	.....	8 0 0
	Ditto	11	33 0 0	.....	3 0 0
	Ditto	19	19 0 0	.....	1 0 0
	Jhow, dry	11	88 0 0	.....	8 0 0
	Ditto	1	6 0 0	.....	6 0 0
	Boeri, dry	5	30 0 0	.....	6 0 0
	Ditto	3	15 0 0	.....	5 0 0
	Ditto	2	8 0 0	.....	4 0 0
	Bolal, dry	2	12 0 0	.....	6 0 0
	Phool „	1	6 0 0	.....	6 0 0
	Semul „	3	15 0 0	.....	5 0 0
	Ditto „	1	1 8 0	.....	1 8 0
	Tickets for collecting canes	15	60 0 0	.....	4 0 0
				2,337 8 0	
			Total	6,373 1 6	
Deduct—Amount due, but not realized during the year				463 0 0	
	Balance			5,910 1 6	
Add—Amount realized on account of former years				62 8 0	
	Total shown as revenue under I, 2 and 3, and II			5,973 9 6	

CHITTAGONG DIVISION.

145. The Commissioner writes as follows:—

"The annexed statement will show the quantities of timber and beams and planks brought down during each of the last four years.

Description of Materials.	Year.			
	1871-72.	1872-73.	1873-74.	1874-75.
	Tons.	Tons.	Tons.	Tons.
Timber in logs	433	1,056	610	1,130
,, in boats	244	1,089	1,640	3,794
Beams and planks	841	19	59	1,110
Total	1,518	2,164	2,759	6,034

"It will be seen that the quantity of timber brought down during the year under review was more than double of that brought down in the preceding year. It is hoped," the Assistant Conservator reports, "that next year the introduction of proper conservancy measures in the newly-formed reserves will check the steadily increasing pressure that is being put on the yield of the forest. We have again this year had an enormous number of dug-out boats brought from the forests, each of which, besides occasioning waste of good wood in its own manufacture, is the cause of numberless young saplings being felled as rollers to admit of its conveyance from the spot where made to the nearest floating streams."

146. "In addition to the timber brought out of the Government forests, as shown above, the following minor produce was brought down during the year under review:—

Bamboos, orah	196,397
,, doloo	641,426
,, moolee	26,816,140
Sun-grass, bundles	6,022,121
Canes	2,327,913
Gurjun-oil	216 mds. 5 srs. 12½ ch."

SECTION VI.—FINANCIAL.

147. The budget estimates and the actuals of the year 1874-75 compare as follows:—

	Budget estimate.	Actuals.	Increase of actuals over budget estimates.	Decrease of actuals below budget estimates.
	Rs.	Rs.	Rs.	Rs.
Receipts	1,21,800	1,85,914	64,114	.....
Expenditure	1,07,852	98,654	.....	9,198
Surplus	13,948	87,260	73,312	

Net result of the year's transactions (Form 28) ... ... Rs. 92,647.

The revenue has been considerably higher than expected, and the expenditure has been kept below the estimate by Rs. 9,198. It should, however, be noted that the receipts include a sum of Rs. 11,152, which does

not represent revenue, as it belongs, and appears in the books as due by the Department to the Rajah of Hill Tipperah. This is owing to the collections on the river Fenny, in Chittagong, having been made by, and credited to, the Department, whereas five-eighths, less cost of collection, should have been paid to the Rajah. This will be done now, and in future the Rajah's share will be paid to him monthly. The real surplus of the Department amounts thus to Rs. 76,108.

148. As compared with the results of 1873-74, the year under review shows as follows:—

		Rs.
Receipt (increase in 1874-75)	... ...	58,129
Expenditure (ditto)	... ...	13,166
Surplus (ditto)	... ...	44,963
Net result (ditto)	... ...	62,393

From these figures the sum of Rs. 11,152, belonging to the Rajah of Hill Tipperah, has been omitted.

Whereas the revenue has risen by Rs. 58,129, the expenditure has risen Rs. 13,166 only. On the whole these results must be considered as satisfactory. Although the financial results are at present considered as of secondary importance only, still a proper balance sheet should never be lost sight of, and the Conservator will, as in duty bound, continue in his efforts to raise the revenue and keep the expenditure within such limits as are dictated by the requirements of an efficient and systematic management.

149. The different divisions participate in the net result of the year's transactions as follows, the expenditure of direction having been divided amongst the five divisions in equal shares:—

Net results of the year's transactions.		Surplus.	Deficit.
Darjeeling division		25,659	.....
Julpigoree		.....	1,808
Palamow		.....	7,453
Sunderbun		.....	5,663
Chittagong		79,763	.....
Dacca		.....	3
Civil officers		2,152	.....
	Total ...	92,647	

150. On reference to the report of 1873-74, it will be observed that in that year only the Chittagong division exhibited a surplus (the forests in Dacca having gone to Assam). During the year under review this division has further improved its position by Rs. 23,957; but there is every reason to expect that the year 1875-76 will show a falling off as compared with the year under review.

151. Cooch Behar showed a deficit of Rs. 4,463 in 1873-74. It has now been divided into Darjeeling and Julpigoree, which two together show a surplus of Rs. 23,851, or an improvement of Rs. 28,314. Darjeeling alone shows a surplus of Rs. 25,659, which is not likely to increase rapidly, though it is sure to do so steadily.

In Julpigoree timber operations were in their infancy during the past year; they have now been extended, and a fair surplus may be expected during the current year.

152. The Palamow forests are in a reduced condition, and all that can be expected for a number of years is that the division pays its way. As yet no revenue has been collected.

153. In the Sunderbun we are just about to commence operations. What their financial results will be it is difficult to say. Only about one-third, though the best, of the Sunderbun forests has been made over to the Department, and the immediate result of conservancy measures will be that

wood-cutters will resort to the other two-thirds, where they have nothing to pay. Considering the subject, therefore, from a financial point of view, it is evident that these remaining two-thirds should also be made over to the Department, not as reserves, but as open forests, in which the Forest Department collects the revenue of forest produce, whereas no difficulties to extension of cultivation would be raised. On the contrary, cultivation may be encouraged, if such a policy is considered called for; but while the land is under forest, the Forest Department should be entrusted with its management.

154. The outstandings of the Department rose during the year from Rs. 6,175 to Rs. 8,008, or by Rs. 1,833, which is chiefly due to sleeper-works in the Darjeeling division; but the debtors are officials of the Department, to whom advances for current work were made. On the whole, the outstandings are insignificant.

SECTION VII.—GENERAL.

ELEPHANTS.

155. During the year two elephants were bought, so that the department owns now the following animals:—

Darjeeling division ...	...	...	...	2
Julpigoree „ ...	...	...	...	5
		Total	...	7

The number of elephants required for the present stands as follows:—

Darjeeling division ...	...	...	...	4
Julpigoree „ ...	...	...	...	7
Palamow and Sarunda	...	...	...	2
Chittagong division ...	...	...	...	2
		Total	...	15

During the current year Rs. 9,000 have been sanctioned, and as no elephants can be obtained here arrangements have been made to get some from Burmah. Assuming that five can be bought with the sum sanctioned, the number of animals would be brought up to 12, so that next year provision for three more, plus casualties, will have to made.

The elephants in the Darjeeling division are used for timber works, and only now and then for travelling. Of those in the Julpigoree division two are set aside for travelling, and the rest for the working of the Buxa reserve. For Chittagong, Sarunda, and Palamow, four elephants are required for four officers, without which they cannot properly attend to their work.

CONSERVATOR'S TOURS.

156. The Conservator visited the plantations in the Darjeeling division repeatedly during the rains of 1874. On the 2nd November he started on his annual inspection tour, visiting first the timber works and several depôts in the Darjeeling division, then Julpigoree, the Buxa reserve, and the proposed Apalchand reserve, whence he returned to Calcutta. He proceeded next to the Sunderbuns, visiting the chief parts thereof; then he went on to Chittagong, visited the Kurnafuli plantation reserve and the experimental teak plantations; then the Myani reserve. He next proceeded to Cox's Bazar, thence up to Bagkhali, and across the watershed between it and the Martamori; then down the Martamori, seeing a portion of the reserve on that river, and back to Chittagong. From Chittagong he passed once more through the Sunderbuns on his way back to Calcutta. The Conservator then visited Hazareebagh, to discuss with the Assistant Conservator the steps to be taken in Palamow, and returned finally to Calcutta on the 8th April 1875.

PROGRAMME OF WORK FOR 1875-76.

157. The foremost object being to complete the selection of the reserves, the time of the officers will, during the coming working season, be chiefly occupied in selecting and laying down the boundaries of the areas to be reserved. If the present number of officers (five) is augmented by four, as anticipated, then it will be possible to attend to the following work in addition to current duties.

DARJEELING DIVISION.

158. Examination and valuation of the Goramara, Latpanchor, and Manna forests. Settlement of disputed boundaries, and consequent re-gazetting of the old reserves.

Selection and preliminary demarcation of the principal new reserves in the Dumsong sub-division. Part of this work has been done during the cold season of 1874-75.

JULPIGOREE DIVISION.

159. The Buxa reserve will be worked according to the provisions of its working plan. No green timber will be cut in the remaining forests.

Selection and demarcation of additional reserves to be commenced in the Apalchand forests and continued in the Tundu forests, next Tursa forests, Borojhar Satalia, and to be concluded in the forests east of the Buxa reserve. If possible the Buxa hill forests should also be taken in hand; if not, they must be left until next year.

PALAMOW.

160. A system of management will be drawn up and carried into effect during the year, now that the forests have been ordered to be gazetted as reserves.

SUNDERBUNS.

161. A system of protecting the sunder-trees against removal, except if above a certain size, and of collecting revenue from the material removed, is being started now.

CHITTAGONG.

162. Detailed survey of the Kurnafuli plantation reserve, with the view of drawing up a plan of operations according to which the area is to be planted up.

Demarcation of the southern boundary of the Myani reserve, and of the northern boundary of the Martamori reserve. If sanction for the proposed establishment is given in time, the reserve will be protected against cutting until a working plan has been decided on.

163. Besides the work in the established divisions, a forest-officer will accompany a special civil officer to be deputed to select and mark off the proposed forest reserves in Sonthal Pergunnahs. Furthermore, the boundaries of the proposed reserve (450 square miles) in Sarunda will be laid down.

SERVICES OF OFFICERS.

164. The Conservator has reason to consider the manner in which the officers of the Department have applied themselves to their duties during the year as satisfactory.

Mr. A. L. Home was on privilege leave from April to July; then in charge of the head office till October, when he took charge of the Julpigoree division. He has continued to work well, and he was promoted at the end of the year to the 2nd grade of deputies.

Captain C. W. Losack was transferred to the Central Provinces in July 1875.

Mr. H. H. Davis is a hard-working officer, with much tact in dealing with the people, and a thorough knowledge of their language.

Mr. J. Sykes Gamble has continued to attend to his duties with great energy. He succeeded in conducting the sleeper operations in his division at a comparatively low rate, and with, on the whole, satisfactory results. He was promoted during the year from the third to the second grade of assistants.

Mr. W. Johnston examined and valued the Palamow forests during the year in an entirely satisfactory manner.

Mr. E. Fuchs has worked on the whole in a tolerably satisfactory manner, but the Conservator would wish to see him exhibit a little more promptitude and exactness in his work.

Mr. S. Kurz, Botanical Gardens, Calcutta, has again freely assisted the Department with botanical knowledge, for which the Conservator offers him his cordial thanks.

W. SCHLICH,
Conservator of Forests, Bengal.

FORM No. 21.

FOREST DEPARTMENT, BENGAL.

Annual Summary of Revenue for the year 1874-75.

CLASSIFICATION.	Darjeeling Division.	Julpigoree Division.	Chittagong Division.	Total.	Add collections by civil officers.	Grand Total.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
I.—Revenue from Wood—						
1. Brought to depôt by departmental agency—						
a.—Timber and bamboos	23,363 14 7	13,737 5 4	.....	37,101 3 11	.....	37,101 3 11
b.—Firewood and charcoal	.....	.....	.....	.....	.....	.....
c.—Sandal-wood	.....	.....	.....	.....	.....	.....
2. Wood and bamboos removed from the forests by purchasers, license-holders, and permit-holders—						
a.—Timber and bamboos	17,837 0 6	5,629 0 0	65,038 5 0	88,504 5 6	.....	88,504 5 6
b.—Firewood and charcoal	831 8 0	.....	3 6 9	834 14 9	.....	834 14 9
3. From confiscated drift and waif wood	265 11 6	283 9 6	.....	549 5 0	.....	549 5 0
II.—Revenue from minor produce—						
1. Grazing-dues and sale of grass	1,798 12 4	.....	.....	1,798 12 4	.....	1,798 12 4
2. Other minor produce	4,357 4 10	60 0 0	43,326 9 9	47,743 14 7	.....	47,743 14 7
III.—Duty on produce of foreign or private forests imported into British territory—						
1. On wood	.....	.....	.....	.....	.....	.....
2. On other forest produce	.....	.....	.....	.....	.....	.....
IV.—Miscellaneous—						
1. From fines and forfeitures	33 4 9	71 0 0	.....	104 4 9	.....	104 4 9
2. From refunds to the department	20 0 0	.....	.....	20 0 0	200 0 0	220 0 0
3. From other sources	2,253 10 0	3 9 5	4,827 13 3	7,085 0 8	1,972 8 3	9,057 8 11
Total	50,761 2 6	19,784 8 3	1,16,196 2 9	1,83,741 13 6	2,172 8 3	1,85,914 5 9

Annual Summary of Expenditure for the year 1874-75.

CLASSIFICATION.	Direction.	Darjeeling Division.	Julpigoree Division.	Palamow Division.	Chittagong Division.	Dacca Division.	Total.	Payments by Civil Officers.	Grand Total.
A.—Conservancy and Works.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
I.—Cost of timber operations—									
1. On wood and bamboos brought to depôt by departmental agency—									
a.—Timber and bamboos	.....	8,112 14 7	7,357 7 0	.....	.....	.....	15,470 5 7	.....	15,470 5 7
b.—Firewood and charcoal	.....	6 3 0	.....	.....	.....	.....	6 3 0	.....	6 3 0
c.—Sandal-wood	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. On wood removed from the forests by purchasers, license-holders, and permit-holders—									
a.—Timber and bamboos	.....	36 2 0	.....	.....	.....	.....	36 2 0	.....	36 2 0
b.—Firewood and charcoal	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. On confiscated drift and waif wood	.....	715 0 6	.....	.....	.....	.....	715 0 6	.....	715 0 6
II.—Cost of collecting minor produce—									
1. Grazing and sale of grass	.....	1 5 0	.....	.....	.....	.....	1 5 0	.....	1 5 0
2. Other forest produce	.....	938 5 7	9 8 0	.....	1,114 0 1	.....	2,061 13 8	.....	2,061 13 8
III.—Cost of forest organization—									
1. Demarcation lines and boundary pillars or marks	.....	92 12 0	349 8 0	.....	.....	.....	442 4 0	.....	442 4 0
2. Working plans	.....	259 1 2	59 14 10	68 9 0	.....	.....	387 9 0	.....	387 9 0
3. Surveys	.....	18 14 0	87 4 6	.....	26 12 3	.....	102 14 9	.....	102 14 9

IV.—Cost of the treatment and creation of forest—								
1. Natural forests—								
a.—Protection from fire	.....	29 9 6	63 0 0	.....	.....	.....	92 9 6	.....	92 9 6
b.—Fencing and enclosing	.....	.....	.....	.....	.....	.....	.....	.....	.....
c.—Improvement and conservation	.....	4 8 3	246 8 3	.....	.....	.....	251 0 6	.....	251 0 6
d.—Reboisement, or restoration of denuded areas	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Artificial forests—									
a.—Formation	.....	4,240 7 7	.....	.....	3,003 10 10	.....	7,244 2 5	.....	7,244 2 5
b.—Protection from fire	.....	85 12 6	.....	.....	.....	.....	85 12 6	.....	85 12 6
c.—Improvement and conservation	.....	467 7 4	.....	.....	.....	.....	467 7 4	.....	467 7 4
d.—Fencing and enclosing	.....	436 11 1	.....	.....	.....	.....	436 11 1	.....	436 11 1
V.—Rent of leased forests	.....	.....	.....	.....	.....	.....	.....	.....	.....
VI.—Cost of collecting duty on produce of foreign or private forests imported into British territory	.....	.....	.....	.....	.....	.....	.....	.....	.....
VII.—Works of utility for the development of forests—									
1. Roads and bridges	.....	279 8 0	444 10 3	.....	14 12 6	.....	738 14 9	.....	738 14 9
2. Buildings and offices	.....	528 4 1	274 0 0	.....	36 14 6	.....	839 2 7	.....	839 2 7
3. Compensation for land taken up for forest purposes, or for extinction of forest rights	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Other works	.....	.....	.....	.....	.....	.....	.....	.....	.....
VIII.—Cost of departmental cattle—									
1. Purchase of stock	.....	.....	4,519 12 0	.....	.....	.....	4,519 12 0	.....	4,519 12 0
2. Hire of stock	.....	.....	.....	40 4 3	.....	.....	40 4 3	.....	40 4 3
3. Feed and keep of cattle	.....	1,597 1 9	888 12 0	.....	.....	.....	2,485 13 9	.....	2,485 13 9
IX.—Cost of departmental plant and tools—									
1. For timber and wood operations	.....	221 7 4	61 9 1	.....	.....	.....	283 0 5	.....	283 0 5
2. For other purposes	450 0 0	355 10 0	93 10 6	.....	258 8 9	.....	1,157 13 3	.....	1,157 13 3
X.—Miscellaneous charges—									
1. Refunds	.....	959 12 0	.....	.....	.....	.....	959 12 0	.....	959 12 0
2. Law charges	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Other charges	.....	197 9 1	10 8 6	.....	8 4 6	.....	216 6 1	20 4 0	236 10 1
Total of *A.—Conservancy and Works*	450 0 0	19,584 6 4	14,436 0 11	108 13 3	4,462 15 5	.....	39,042 3 11	20 4 0	39,062 7 11
B.—Establishments.									
I.—Salaries—									
1. Pay of Conservator	12,000 0 0	.....	.....	.....	.....	.....	12,000 0 0	.....	12,000 0 0
2. Pay of control and executive officers	8,048 4 0	5,343 5 4	5,000 0 0	1,000 0 0	4,200 0 0	.....	23,591 9 4	.....	23,591 9 4
3. Protective establishments	.....	2,476 11 1	2,192 14 8	.....	3,510 5 9	.....	8,179 15 6	.....	8,179 15 6
4. Office establishments	3,671 15 2	747 4 2	597 14 10	142 7 10	925 9 3	.....	6,085 3 3	.....	6,085 3 3
5. Deputation and special allowances	.....	.....	.....	.....	.....	.....	.....	.....	.....
II.—Travelling allowances—									
1. Conservator	2,377 15 8	.....	.....	.....	.....	.....	2,377 15 8	.....	2,377 15 8
2. Control and executive officers	1,199 1 0	1,390 4 0	1,098 0 0	525 9 0	811 8 0	.....	5,024 6 0	.....	5,024 6 0
3. Protective establishments	.....	.....	.....	.....	387 7 8	.....	387 7 8	.....	387 7 8
4. Office establishments	203 13 11	11 11 6	5 4 3	.....	26 15 6	.....	247 13 2	.....	247 13 2
III.—Contingencies—									
1. Stationery	.....	0 4 0	4 0 6	.....	1 5 0	.....	5 9 6	.....	5 9 6
2. Carriage of tents and records	63 2 9	96 5 6	28 15 6	.....	21 0 3	0 8 0	209 0 0	.....	209 0 0
3. Pay of police-guards	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Sundries	559 3 0	199 11 0	105 0 3	13 0 6	215 1 6	2 12 0	1,094 12 3	.....	1,094 12 3
5. Official postage	191 9 6	124 4 0	44 12 6	.....	27 1 6	.....	387 11 6	.....	387 11 .6
Total of *B.—Establishments*	28,315 1 0	10,389 12 7	9,076 14 6	1,681 1 4	10,125 6 5	3 4 0	59,591 7 10	.....	59,591 7 10
Grand total of all expenditure	24,765 1 0	29,974 2 11	23,512 15 5	1,789 14 7	14,588 5 10	3 4 0	98,633 11 9	20 4 0	98,653 15 9

Form No. 22.

FOREST DEPARTMENT, BENGAL.

Annual Abstract Account of the Cash Transactions of the Department during the year 1874-75.

Dr.	Rs. A. P.	Rs. A. P.	Cr.	Rs. A. P.	Rs. A. P.
To cash in hand on the 1st April 1874	690 3 5	690 3 5	By expenditure of the Department.		
„ revenue received	1,85,914 5 9	1,85,914 5 9	A.	39,062 7 11	
„ remittances from State treasuries	97,992 13 1		B.	59,591 7 10	98,653 15 9
„ „ „ Government of the Central Provinces by transfer	450 0 0		„ remittance to public treasuries	1,62,813 2 1	
„ remittances from Government of the North-Western Provinces by transfer	24 12 0		„ remittance to Department Public Works by book transfer	6,564 11 3	
„ remittances from the Public Works Department by book transfer	20 0 0		„ remittance to Northern Bengal State Railway by book transfer	16,589 1 9	1,85,966 14 1
„ remittances from the Government Mathematical Instrument Department by book transfer ...	269 10 0		„ advances recoverable ...	30,296 0 9	30,296 0 9
„ remittances from the Indian Medical Department by book transfer	14 1 11	98,771 5 0	„ provincial services	100 0 0	100 0 0
„ advances recovered	28,463 3 8	28,463 3 8	„ refund of revenue	6 0 0	6 0 0
„ sale of stationery-boxes	1 0 0	1 0 0	„ deposits refunded	1 8 9	1 8 9
„ deposits received	1 8 9	1 8 9	„ cash balance in hand on the 31st March 1875	502 2 3	502 2 3
„ Uncovenanted Service Family Pension Fund	1,684 15 0	1,684 15 0			
Total		3,15,526 9 7	Total		3,15,526 9 7

Form No. 23.

FOREST DEPARTMENT, BENGAL.

Annual Statement of Outstandings and Liabilities on account of Contractors and Disbursers for the year 1874-75.

Divisions.	Department Debtor.			Department Creditor.				Balance Due.
	Recoveries in cash and value of supplies and work done during the year.		Total.	At commencement of year.		Payments made during the year.	Total.	To Department (Outstanding).
	By transfer.	By works or supplies.		By transfer.	By cash.			
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Direction	.....	600 0 0	600 0 0	.....	.....	862 8 0	862 8 0	262 8 0
Cooch Behar Division* ...	5,807 14 8	3,894 1 4	9,702 0 0	.....	6,032 12 2	3,669 3 10	9,702 0 0	.....
Darjeeling „ ...	.....	14,018 8 7	14,018 8 7	4,368 0 4	.....	15,286 1 3	19,654 1 7	5,635 9 0
Julpigoree „ ...	.....	8,041 12 10	8,041 12 10	1,439 14 4	.....	8,389 15 8	9,829 14 0	1,788 1 2
Bhagulpore „ ...	130 2 0	.....	130 2 0	.....	130 2 0	.....	130 2 0	.....
Palamow „ ...	.....	.....	.....	130 2 0	.....	.....	130 2 0	130 2 0
Chittagong „ ...	.....	1,908 12 11	1,908 12 11	.....	.....	2,088 4 0	2,088 4 0	179 7 1
Dacca „ ...	.....	.....	.....	.....	12 0 0	.....	12 0 0	12 0 0
Total ...	5,938 0 8	28,463 3 8	34,401 4 4	5,938 0 8	6,174 14 2	30,296 0 9	42,408 15 7	8,007 11 3

* Cooch Behar Division was broken up into two divisions, the Darjeeling and Julpigoree Divisions, from November 1874.

FORM No. 24.

FOREST DEPARTMENT, BENGAL.

Statement of Timber brought to Depôt from the different Forest Divisions during the year 1874-75.

Name of River or Division.	Name of depôt.	Name of forest from which received.	Description of timber.	Pieces.	Cubic feet.	Total of each River or Division. Pieces.	Total of each River or Division. Cubic feet.
Darjeeling ...	Silligoree	Terai and lower hills...	Sál sleepers, broad gauge	564	1,880		
			Ditto, narrow gauge	946	1,261		
			Sál planks and scantlings	18	50		
	Sivok	Sivok	Sál logs	31	1,197		
	Julpigoree... ...	Teesta river drift ...	Tun logs	2	97		
			Sissoo logs	3	41		
			Saj sleepers, broad gauge	3	10		
			Miscellaneous logs	4	148		
	Sookna	Sookna	Sál logs	95	2,807		
			Sissoo logs	500	4,144		
			Sál sleepers, broad gauge	3,565	11,873		
			Ditto, narrow gauge... ...	7,567	10,000		
			Chilauni sleepers, ditto	39	52		
			Saj sleepers, ditto	20	27		
			Planks and scantlings	161	631		
			Kala khambas	3	.....		
	Rungbul	Rungbul	Katus logs	10	436		
						13,531	34,804
Julpigoree ...	Julpigoree... ...	Teesta river drift ...	Sál logs	2	32		
			Tun logs	3	93		
		Lish and Ghish ...	Sál sleepers, broad gauge	600	2,000		
	Alipore	Buxa reserve	Sál logs	688	16,793		
		Ditto confiscated ...	Kala khambas	79	393		
		Ditto reserve	Sál sleepers, broad gauge	9	30		
			Planks and scantlings	39	45		
	Patlakhawa ...	Borojhar confiscated...	Kala khambas	92	.....		
	Muraghat	Muraghat reserve ...	Sál sleepers, broad gauge	42	84		
			Planks and scantlings	44	40		
						1,598	19,516
			Total ...	.....	.....	15,129	54,320

A separate account is kept of timber brought from the Darjeeling division for sale at Julpigoree.

FORM No. 25.

FOREST DEPARTMENT, BENGAL.

Annual Timber account for 1874-75.

PARTICULARS.	Pieces.	Total.
I.—Stock in hand in the following divisions at commencement of the year.		
Darjeeling Division.		
Logs 1,193		
Sleepers, broad gauge 14,425		
Ditto, narrow gauge		
Planks and scantling 452		
Kala khambas 60		
	16,130	
Julpigoree Division.		
Logs 331		
	331	
		16,461
II.—Timber received at depôts from the forests.		
Darjeeling Division.		
Logs 645		
Sleepers, broad gauge 4,132		
Ditto, narrow gauge... 8,572		
Planks and scantling 179		
Kala khambas 3		
	13,531	
Julpigoree Division.		
Logs 693		
Sleepers, broad gauge 651		
Planks and scantling 83		
Kala khambas 171		
	1,598	
		15,129
Total	.....	31,590

PARTICULARS.	Pieces.	Total.
I.—Timber removed by purchasers from depôts.		
Darjeeling Division.		
Logs 314		
Sleepers, broad gauge... 10,540		
Ditto, narrow gauge 2,968		
Planks and scantling 201		
Kala khambas 10		
	14,033	
Julpigoree Division.		
Logs 625		
Kala khambas 140		
	765	
		14,798
II.—Timber lost or used by the department.		
Darjeeling Division.		
Logs 18		
Sleepers, broad gauge... 1		
Planks and scantling 46		
	65	
Julpigoree Division.		
Logs 3		
Kala khambas 26		
	29	
		94
III.—Stock in hand at close of the year.		
Darjeeling Division.		
Logs 1,506		
Sleepers, broad gauge... 8,016		
Ditto, narrow gauge 5,604		
Planks and scantling 384		
Kala khambas 53		
	15,563	
Julpigoree Division.		
Logs 396		
Sleepers, broad gauge... 651		
Planks and scantling 83		
Kala khambas 5		
	1,135	
		16,698
Total ...	.....	31,590

Detail of timber lost or used by the department—

Darjeeling division... 12 logs free grant to Hope Town Church. Bengal Government letter No. 3085, dated 28th September 1874.
6 „ short in Julpigoree depôt.
1 sleeper repairing departmental cart.
46 planks and scantling used in departmental buildings and furniture.
Julpigoree ditto ... 3 „ written off, rotten and useless.
26 kala khambas, used in building depôt-munshi's house, and as boundary-post in Alipore depôt.
Total ... 94 pieces.

Explanation of difference between closing balance of 1873-74 *and opening balance of* 1874-75.

	Logs.	Sleepers.	Planks and scantling.	Kala khambas.	Total.
Balance at station-depôts at close of the year 1873-74	1,796	14,403	452	40	16,691
Deduct—Balance at Rajabhatkaua at close of the year 1873-74 excluded, being a forest-depôt	620	.....	.....	.....	620
Total	1,176	14,403	452	40	16,071
Add—Balance at the following forest-depôts, which are sale-depôts, from the current year:					
Sivok, in the Darjeeling division ...	237	22	.....	.....	259
Murarhat, in the Julpigoree division	111	.....	.....	.....	111
Add—Excess found in the Siligoree depôt, in the Darjeeling division ...	.....	.....	.....	20	20
Opening balance of the year 1874-75 ...	1,524	14,425	452	60	16,461

The balance in stock at the forest-depôts at close of the year 1873-74 has been excluded from this statement under orders of the Government of India, Department of Revenue, Agriculture, and Commerce, No. 345, dated 20th March 1875, received with Government of Bengal's letter No. 1196, dated 8th April 1875.

Form No. 26.

FOREST DEPARTMENT, BENGAL.

Statement showing the amount realized on account of the different classes of Timber sold during the year 1874-75.

Name of Division and Description of Timber.	Number of logs and pieces.	Cubical contents.	Amount realized and due on account of timber sold.	Average amount per log.	Average cubical contents per log.	Average amount per ton of 50 cubic feet.	Remarks.
			Rs. A. P.	Rs. A. P.		Rs. A. P.	
Darjeeling Division.							
Sál logs	254	6,002	7,327 14 4	28 13 7	27·	53 6 9	
Sissoo logs	3	35	32 13 3	10 15 1	11·	49 11 10	
Tun logs (drift)	2	98	146 5 1	73 2 6	49·	74 10 4	Revenue included under heading I-3.
Hill forest logs	55	2,230	31 0 0	0 9 0	40·54	0 11 1	
Sál broad gauge sleepers	10,537	35,123	18,088 4 0	1 11 5	3·33	25 11 11	
Sál narrow gauge „	2,968	3,057	5,194 0 0	1 12 0	1·03	85 5 4	
Saj broad gauge „	3	10	6 12 0	2 4 0	3·33	33 12 0	
Sal scantling	118	391	829 13 3	7 0 5	3·31	106 1 10	
Sissoo „	17	13	19 8 0	1 2 4	·76	75 0 0	
Tun „	31	32	40 4 0	1 4 9	1·03	63 4 6	
Champ „ (drift)	35	18	35 6 5	1 0 2	·51	98 5 5	Revenue included under heading I-3.
Kala khambas	10	112	42 0 0	4 3 2	11·20	18 12 0	
Julpigoree Division.							
Sál logs	625	16,398	13,482 14 10	21 9 2	27·19	39 10 6	Eighteen logs (confiscated) containing 136 cubic feet, which realized Rs. 68-1-6, included under heading I-3.
Kala khambas	140	.....	253 8 0	1 12 11	.....	.....	
Total	14,798	65,917	45,530 7 2	3 1 2	4·45	34 8 6	
Deduct—Amount due, but not yet realized			8,248 6 3				
Balance ...			37,282 0 11				
Add—Amount realized on account of former years			69 0 0				
Total shown as revenue on account of timber sales			37,351 0 11				

Form No. 27.

FOREST DEPARTMENT, BENGAL.

Statement showing the amount expended on account of Timber received from the different Forest Divisions during 1874-75.

Divisions.	Number of pieces.	Cubical contents.	Timber expenses.	Conservancy expenses, cost of establishment, &c., excluding direction.	Total amount expended, excluding direction.	Average amount paid per piece.	Average cubical contents per piece.	Average amount paid per cubic foot.	Remarks.
			Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.		Rs. A. P.	Column 5.—The amount actually incurred for stock for timber purposes has been taken at half-expenditure for stock (cattle) in Darjeeling and two-thirds in Julpigoree. Establishment charges have been taken at one-third in Darjeeling and one-eighth in Julpigoree of the entire establishment charges.
Darjeeling ...	13,730*	38,544	8,119 1 7	4,483 4 4	12,602 5 11	0 14 8	2·8	0 5 2	
Julpigoree ...	1,598†	19,516	7,357 7 0	1,788 10 11	9,146 1 11	5 11 7	12·21	0 7 6	
Total ...	15,328	58,060	15,476 8 7	6,271 15 3	21,748 7 10	1 6 8	3·78	0 5 11	

* Includes 179 logs and 20 broad gauge sleepers transported from one sale-depôt to another, containing 3,740 cubic feet.

† Besides these 254 logs, containing 3,451 cubic feet, have been brought out of the Buxa reserve ready for carting to the sale-depôt next season.

REVISED FORM No. 28.

FOREST DEPARTMENT, BENGAL.

Annual Account of Revenue realized in the Forest Department, Bengal, during 1874-75.

DR. CR.

RECEIPTS.	Rs.	A.	P.	DISBURSEMENTS.	Rs.	A.	P.
Amount of revenue realized in 1874-75 ...	1,85,914	5	9	Amount disbursed in 1874-75	98,653	15	9
Deduct— Amount realized on account of previous periods	*3,187	1	9	*Deduct*— Amount disbursed on account of transactions of previous periods	950	3	6
Balance ...	1,82,727	4	0	Balance ...	97,703	12	3
Add— Outstandings on account of the year, Rs. 8,955 11 6 Minus for bad debts	8,955	11	6	*Add*— Amount due for transactions during the year under review, but not yet disbursed ...	†11,645	11	3
Value of the year's transactions	1,91,682	15	6	Real cost of the year's transactions	1,09,349	7	6

	Rs.	A.	P.
Value of the year's transactions	1,91,682	15	6
Cost of ditto ditto	1,09,349	7	6
Balance ...	82,333	8	0
Add— Difference between the value of stock at commencement and close of the year	10,313	7	3
Net result of the year	92,646	15	3

* Difference of Rs. 1,054 6 6 revenue collections by civil officers credited direct in Accountant-General's Office.
0 1 6 pending adjustment.
Total ... 1,054 8 0 difference with amount shown outstanding in 1873-74.

† ½ of Rs. 17,843-2-0, being collections on the Feuny river, in Chittagong, due to the Rajah of Hill Tipperah.

Explanation of difference between the value of Stock at commencement and close of the year 1874-75.

		Sale value of excess stock at close of the year.			Sum required to replace deficiency at close of the year.			Difference. In favour of the year.			Difference. Against the year.		
		Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.	Rs.	A.	P.
Darjeeling Division ...	313 Logs at Rs. 11 each	3,443	0	0	.....								
	6,400 Sleepers, broad gauge, at Rs. 1-4-0 ...	.....			8,011	4	0						
	5,604 „ narrow „ at „ 1-10-7 ...	9,317	0	0	.....								
	68 Planks and scantlings at „ 0-6-0 ...	.....			25	8	0						
	7 Kala khambas at „ 0-4-0 ...	.....			1	12	0						
	Other stock	.....			2,018	4	9						
	Total Darjeeling Division ...	12,760	0	0	10,056	12	9	2,703	3	3	.....		
Julpigoree „ ...	65 Logs at Rs. 22 each	1,430	0	0	.....								
	651 Sleepers, broad gauge, at Rs. 2-4-0 ...	1,464	12	0	.....								
	83 Planks and scantling at „ 0-8-0 ...	41	8	0	.....								
	5 Kala khambas at „ 5-0-0 ...	25	0	0	.....								
	Other stock	4,649	0	0	.....								
	Total Julpigoree Division ...	7,610	4	0	.....			7,610	4	0	.....		
	Total ...	.....			.....			10,313	7	3	.....		

Area of Reserved Forests in 1874-75.

RESERVED FORESTS.		Area in 1873-74.	Added during the year.	Excluded or transferred to other heads.	Total remaining in 1874-75.
		Sqr. miles.	Sqr. miles.	Sqr. miles.	Sqr. miles.
Darjeeling Division ...	Hill Tracts	75	.....	.....	75
	Terai	31	.....	.....	31
Julpigoree „ ...	Muraghat Forest	12	5	.....	17
	Dainah Sissoo „	2	.....	.....	2
	Buxa plain „	.....	110	.....	110
Sunderbun „ ...	Sunderbun „	.....	885	.....	885
Chittagong „ ...	Myanee „	.....	339	.....	339
	Karnafuli Plantation Reserve	.....	8	.....	8
	Total ...	120	1,347	.....	1,467

FOREST DEPARTMENT, BENGAL.

Area of Unreserved Forests in 1874-75.

Unreserved Forests.	Area in 1873-74.	Added during the year.	Excluded or transferred to other heads.	Total remaining in 1874-75.	Remarks.
	Sq. miles.	Sq. miles.	Sq. miles.	Sq. miles.	
Darjeeling Division	...	...	...	...	Area not known.
Julpigoree „	329	...	115	214	115 square miles declared reserves.
Chittagong „	5,670	...	347	5,323	347 ditto ditto.
Total	5,999	...	462	5,537	

FOREST DEPARTMENT, BENGAL.

Area of Plantations for the year 1874-75.

Name of Plantation.	Area in 1873-74.	Total cost.	Area added during 1874-75.	Amount expended during 1874-75.	Total area up to 1874-75.	Total expenditure incurred up to 1874-75.	Remarks.
Darjeeling Division.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	
Rungbool	144	9,404 1 3	.....	780 9 0	144	10,184 10 3	Formerly area was given as 450 acres, but a survey made during the year gives 144 acres.
Bamunpokree	91	9,591 15 4	.....	4,325 12 6	91	13,917 11 10	No area added. Employed in filling up the old portion.
Dhobi Jhora	42	32 0 0	.....	.....	42	32 0 0	
Rungyroom chestnut plantation	.....	.....	1	103 8 0	1	103 8 0	
Sivok India-rubber nursery ...	.....	.....	.....	8 12 0	.....	8 12 0	A nursery of cuttings and toon-seeds only. Experimental.
Julpigoree Division.							
Fallacotta	3	204 4 11	.....	.....	3	204 4 11	
Chittagong Division.							
Sitapahar	10	637 12 6	38	1,084 15 6	48	1,722 12 0	
Pahartulli	5	324 14 6	.....	.....	5	324 14 6	
Holingamara	48	2,018 15 7	45	1,918 11 4	93	3,937 10 11	
Add—Amount expended on failures	.....	387 15 9	.....	1 8 6	.....	389 8 3	
Total ...	343	22,601 15 10	84	8,223 12 10	427	30,825 12 8	

Rs. 10-4-6, excess shown in Form 21, represents cost of supplying seeds to other departments.

FOREST DEPARTMENT, BENGAL.

Area of Forest Tracts protected from fire up to 1874-75.

Forests.	Area in 1873-74.	Total cost.	Additional area protected in 1874-75.	Amount expended in 1874-75.	Total area protected up to 1874-75.	Total expenditure incurred up to 1874-75.	Remarks.
Darjeeling Division.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	Acres.	Rs. A. P.	
Sivok	.....	136 7 6	.....	29 9 6	.....	166 1 0	
Julpigoree Division.							
Muraghat...	7,680	61 10 0	3,240	63 0 0	10,920	124 10 0*	* Rs. 63 expended in 1873-74 charged in 1874-75. Rs. 40-12 expended in cutting fire-path, but not charged until 1875-76.
Total	7,680	198 1 6	3,240	92 9 6	10,920	290 11 0	

FOREST DEPARTMENT, BENGAL.

Prosecutions for breaches of Forest Rules during 1874-75.

Divisions.	No. of Prosecutions.		Convictions obtained or still pending.			
			No. of cases.		No. of persons.	
	No. of cases.	No. of persons.	Convictions.	Pending.	Convicted.	Under trial.
Darjeeling Division	13	30	10	1	24	1
Julpigoree „	6	12	4	1	7	3
Total	19	42	14	2	31	4

Bengal Forest Account Office;
Calcutta,
The 6th August 1875.

W. Schlich,
Conservator of Forests, Bengal.

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APPENDIX I.

List of the more conspicuous trees observed in the Chittagong Forests, by Dr. W. Schlich, Conservator of Forests, Bengal, during a short visit in January and February 1875.

Number.	Name of Family.	Systematic Name.	Local Name. B—Bengalee; M—Mucki; Ch—Chakma.	Remarks.
1	Dilleniaceæ	Dillenia Indica	Chalta (B) ... ... Thapru (M)	In large quantities near water-courses.
2	Ditto	Ditto pentagyna	Akshi (B) ... ... Zambrun (M)	In outer hills chiefly.
3	Bixineæ	Hydnocarpus teterophyllus ...	Toungpung (M)	
4	Guttiferæ	Garcinia paniculata	?	(?)
5	Ditto	Ditto Xanthochymus ...	Domol (Ch) ... ... Prewua (M)	Wood used largely; fruit acid; eaten.
6	Ditto	Mesua ferrea	Nagesur (B) ... ... Kaing-go (M)	The iron-wood of Assam.
7	Dipterocarpeæ ...	Dipterocarpus pilosus, (Roxb.)	Gurjun (B) ... ... Kanyang wroakri (M)	The Chittagong wood-oil tree.
8	Ditto	Ditto turpinatus ...	Kanyoung (M)	
9	Malvaceæ	Bombax Malabaricum... ...	Simul (B) Lapaing (M)	
10	Ditto	Ditto insigne...	Simul } Thula } (B) Saitu (M)	
11	Ditto	Hibiscus Macrophylus ...	Kachia udal (Ch) ... Sho (M)	Bark used for rope, wood for rafters
12	Tiliaceæ	Elæocarpus robustus	Chekio (M)	
13	Ditto	Echinocarpus sterculiaceus ...	Thabola (M)	Large tree, but wood not used.
14	Burseraceæ	Garuga pinnata	Badi (B) ... ... Mroung-tshisha (M)...	There are several trees called Badi, only one of which has been identified.
15	Ditto	Burseracea	Kamareug (B)... ... Saikoai (M)	Fine large tree, wood hard, used for oil-mills and rice-mortars.
16	Meliaceæ	Amoora Rohituka	Petrach (B) ... ... Okhloungza (M)	Wood hard, cut for boats, said to be as good as Chaplis.
17	Ditto	Aglaia Chittagonga	Thitpasaing (M) ...	Large tree, hard wood, used largely.
18	Ditto	Chikrassia tabularis	Chikarassi (B)... ... Saiphru (M)	The Chittagong wood.
19	Anacardiaceæ ...	Semecarpus accuminatus ...	Bella (B) Khreik (M)	
20	Ditto	Drimycarpus racemosus ...	Telsur (B) ... ... Sangaipru (M)	Fine large tree, used for boats.
21	Ditto	Holigarna longifolia	Barola (Ch) Khreik (?) (M)	
22	Leguminosæ... ...	Parkia biglobosa	?	
23	Ditto	Adenanthera pavonina ...	Gung (M)	
24	Ditto	Albizzia stipulata	Chakua (B) Pokoh (M)	
25	Ditto	Ditto procera...	Koroi (B) ... ... Choi (M)	Cut for boats.
26	....	Leguminosa	Kukitaitoi (Ch) Mlaung-hmo (M)	
27	Combretaceæ ...	Anogeissus accuminatus ...	Chakwa (B) Saikameh-hia } Thekri-napay } (M)	
28	Ditto	Terminalia bellerica	Burra (B) ... ... Seching (M)	Used as timber for various purposes.
29	Myrlaceæ	Eugenia Jambolena	Jam (B) Kau (M)	White bark.
30	Ditto	Ditto fruticosa	Moung-zebri (M) ...	(Red bark.) Wood, though hard, not much used.
31	Ditto	Ditto grandis (Wight) ...	Jam (B) Zebri (M)	
32	Lythrarieæ	Lagerstrœmia Reginæ	Kauda jarul (B) ... Kamaung (M)	The most valuable of all Chittagong timber-trees. Used for boats and as timber.
33	Ditto	Ditto floribunda ...	Jarul }	
34	Ditto	Ditto macrocarpa ...	Ditto } (B)	
35	....	Ditto sp.	Ditto }	
36	Ditto	Duabanga Sonneratoides ...	Bandorhulla }	
37	Rubiaceæ	Naucleæ Sericea (Wall) ...	Kum } (B) Thaing (M)	
38	Ditto	Ditto cordifolia	Bangka (B)	
39	Ditto	Ditto cadamba	Kadam (B)	
40	Ditto	Rubiacea	Hmoung-choung (M) Songrasing (B) ...	Soft wood.
41	Sapotaceæ	Isonandra polyantha	Tali (B)...	Wood prized as timber.
42	Ditto	Chætocarpus Castanecarpus..	Thekada (M) ... ... Baiganapatta (B) ...	Large tree with hard wood.
43	Ebenaceæ	Diospyros ramiflora	Toung-pung (M) (?)... Chalmukri (B) (?) ...	Hard wood, used for posts. The oil prepared from this tree is highly prized for medicinal purposes.
44	Ditto	Ditto sp.	Kalidagoni (B) Prenæ (M)	Very hard wood, used in large quantities.
45	Bignoniaceæ... ...	Sterios permum Chelonioides	Dharmara (B) Tsaing-tsa (M)	
46	Ditto	Bignoniacea (?)	Badi (B) Mroung-tshisha (M)	
47	Verbenaceæ	Vitex lencoxylon...	Goda horina (B) ... Tokra (M)	Not much used.
48	Ditto	Ditto alata	Boruna (B) ... ... Krauru (M)	Timber used for planks chiefly.
49	Ditto	Gmelina arbora	Gambar (B) ... ... Ramoni (M)	One of the most prized woods.
50	....	Callicarpa arborea (?)		
51	Laurineæ	Cinnamomum oblusifolium ...	Tuzpata (B) ... ... Krowai (M)	Used as timber.
52	....	Phœbe pubescens	Chekio (M)	Not used.
53	Euphorbiaceæ ...	Macaranga gummiflua... ...	Pawaing (M) ... ... Burua (Ch)	Used.
54	Ditto	Phyllanthus Emblica	Ambolati (B)	
55	Ditto	Bischofia Javanica	?	
56	Ditto	Baccaura sapida...	Kamaizu (M)	Used of small size.
57	Ditto	Flomonoya riparia	Ri-sapaing (Ch) Shealbuk (M)	

APPENDIX I.—(*Continued.*)

List of the more conspicuous trees observed in the Chittagong Forests, by Dr. Schlich, Conservator of Forests, Bengal, during a short visit in January and February 1875.—(Continued.)

Number.	Name of Family.	Systematic Name.	Local Name. B. Bengalee, M. Mucki, Ch. Chakma.	Remarks.
58	Urticaceæ	Artocarpus chaplasha	Chaplis (B) ... .. Pani (M)	This tree is of very fine dimensions, used for boats.
59	Ditto	Streblus asper	Sarna (?) (B) ... ... Ungnai (M)	Wood not used.
60	Ditto	Ficus cunia	Dumbur (B) ... ... Sodoi (M)	Edible fig.
61	Ditto	Ditto glomerata	?	
62	Ditto	Ditto obtusifolia...	Dato (M)	
63	Ditto	Ditto nitida	?	
64	Ditto	Ditto Chittagonga	Iogona (B) ... ... Saphai (M)	Leaves eaten in curry.
65	Ditto	Ditto hispida	Damar (B) Maiu-lok (M)	
66	Ditto	Ulmus lancifolia...	?	
67	Juglandaceæ ...	Engelhardtia spicata	?	
68	Cupuliferæ	Castanea sp.	Bazana (Ch) Gnuaing-thoung (M)	
69	Gramineæ	Bambusa sp.	Dholu (B) ... ... Mro (M)	(Seems new.)
70	Ditto	Ditto	Daragu (M)	
71	Ditto	Ditto Tulda	Mitinga (B) Madae-mah (M)	
72	Ditto	Memecylon celastrinum ..e	Min (M)	
73	Ditto	Melocanna baccifera (?) ...	Mull (B) Kayoung-wah (M)	
74	Ditto	Prendostachyum Glomeriflorum	Lota bans (B) Wah-noe (M)	
75	Ditto	?	Ura (B) Toung-wah (M)	
76	?	?	Sudaguia (B)	Large tree, but wood soft, and not used.
77	....	....	Kreng doaing (M)	Hard wood.
78	....	....	Suruti (B)	Soft wood.
79	....	....	Sengmroh (M)	Large tree, wood not used.
80	....	....	Koh (Ch) ... ... O-houng (M)	Large tree, wood hard, and used.
81	....	....	Lukhadi (B) ... ... Thakiaing (M) ...	Large tree, wood hard, used for posts, planks, &c.
82	....	....	Kurahar (Ch) ... ... Lekro (M)	Large tree, wood hard, cut for plough, &c.
83	....	....	Kandeb (B)	One of the best woods in Chittagong, used largely.
84	....	....	Min (M)	Large tree, wood very hard, used in large quantities. The blue berries used for dying black.
85	....	....	Thibit (B) ... ... Saungbang (M) ...	Large tree, wood moderately hard, has come into use lately.
86	....	....	Boilsur (B)	Fine large tree, used for boats.

W. Schlich,
Conservator of Forests, Bengal.

APPENDIX II.

Statement showing the result of Forest Valuation Surveys in the Buxa Plain Reserve.

Number.	Position of Line of Survey.	TREES MEASURED.																									Area of survey in acres.	Remarks.
		Sal.							Chilowner.							Khair.					Sissoo.					Toon.		
		I.	II.	III.	IV.	V.	VI.	VII.	I.	II.	III.	IV.	V.	VI.	VII.	I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	III.		
		Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Between 5 and 6 cubits.	Between 6 and 7 cubits.	Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Between 5 and 6 cubits.	Between 6 and 7 cubits.	Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Between 2 and 3 cubits.		
1	From 19th mile-post on Alipore-Buxa road, due east to Guddadhur.																											
1a.	Rajabathkhawur sál forest	1,240	314	138	111	70	7	1	2	4	4	7	5	...	...	...	...	...	...	...	...	...	...	...	...	...	40·46	
1b.	Balla savannah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2·92	
1c.	Panbaree sál	459	252	97	63	13	3	...	2	3	27	13	1	...	...	...	...	...	...	...	...	...	...	...	...	...	17·32	
1d.	Panbaree sál	144	63	17	8	2	3	...	...	4	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	5·26	
1	Total ...	1,843	628	252	182	85	13	1	4	11	31	20	7	...	...	...	...	...	...	...	...	...	...	...	...	...	65·96	
2	From 21st mile-post on Alipore-Buxa road, due east to Guddadhur.																											
2a.	Rajabathkhawur sál ...	628	433	151	43	11	2	...	...	11	8	7	4	1	1	...	...	...	...	...	...	...	...	...	...	...	22·72	
2b.	Balla savannah	96	30	13	7	5	1	...	...	4	4	1	...	...	...	...	...	...	...	...	23	...	...	...	...	...	17·29	
2c.	Panbaree sál	918	346	172	140	63	2	...	6	5	9	10	11	1	...	...	...	...	...	...	...	...	...	...	...	...	41·32	
2	Total ...	1,642	809	336	190	79	5	...	6	20	21	18	15	2	1	...	...	...	...	...	23	...	...	...	...	...	81·33	
3	From 23rd mile-post on Alipore-Buxa road, due east to Guddadhur.																											
3a.	Rajabathkhawur sál ...	184	147	62	11	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5·74	
3b.	Cultivation	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5·16	
3c.	Rajabathkhawur sál ...	113	44	24	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2·87	
3d.	Baromalee savannah ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18·82	
3e.	Panbaree sál... ...	1,484	220	136	38	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	21·36	
3f.	Detached savannah ...	...	4	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4·59	
3g.	Panbaree sál... ...	105	68	30	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2·29	
3	Total ...	1,886	486	254	55	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	60·83	
4	From 25th mile-post on Alipore-Buxa road, due east to Guddadhur.																											
4a.	Rajabathkhawur sál ...	251	183	98	42	20	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14·46	
4b.	Baromalee savannah ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8·49	
4c.	Balla, sissoo, and khair ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	44	3	1	...	...	...	3·44	
4d.	Panbaree sál... ...	317	137	26	10	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6·89	
4e.	Detached savannah ...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6·89	
4f.	Panbaree sál... ...	192	251	280	172	31	...	...	...	...	...	...	...	...	...	...	3	2	1	...	...	...	...	...	...	...	27·55	
4g.	Panbaree khair ...	6	3	3	5	...	...	...	...	...	...	...	...	...	...	6	24	21	26	9	...	...	...	...	...	...	6·88	
4h.	Panbaree sál... ...	104	37	35	17	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3·44	
4i.	Detached savannah ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1·15	
4	Total ...	871	613	442	246	55	6	...	...	...	...	...	...	...	...	7	27	23	27	9	44	3	1	...	...	...	79·19	

There is little to note until 4,500′, between which and 8,000′ there is a fine piece of sál forest. Between 8,000′ and 9,000′ the line crosses different nuddees, then enters a magnificent block of sál forest, all classes of trees as regards age being represented. After crossing the Kalkoot the ground is fairly stocked until 17,500′ is reached. The line then crosses the Balla, and runs through a fine extensive clean sál forest with a sprinkling of chilowner; this extends to 26,500′. Enters the sál again at 33,000′, and runs to the Guddadhur through a well-stocked forest, in which there are a good many mature trees.

After this line enters the forest, the return shows it to be rather poorly stocked; the number of mature trees met with is small. This class of forest extends to 10,400′, when the line enters a maidan, and only passes through a couple of small sál patches before it reaches the Balla, after crossing which a splendid sál forest is traversed, extending to 34,930′.

Going north the forest does not improve, as this line, after running 2,000′ through a younger than the other two lines south, enters a large tract of cultivation, and does not touch any sál until 4,500′, when it runs through a small patch of same; after which the open maidan is met with, extending over the Balla to 15,000′. The sál then extends to the Cheko Nuddee, after passing through the maidan marked on the map.

This line gives a better return, running as it does through a fairly stocked sál forest, mature trees being met with near the road. This forest extends to the Nonai, after which open maidan is met with, reaching to the Balla. After crossing same the line passes through a young well-stocked sál forest reaching to 14,000′, then passes through a maidan, and again enters the sál at 18,000′, through which it runs until 29,500′ is reached, when a fine piece of khair is met with, extending to 32,500′, after which sál again presents itself and runs to 34,000′. The line then passes through a maidan.

5	*From 27th mile-post on Alipore-Buxa road, due east to Guddadhur.*																										
5a.	Rajabathkhawur sâl ...	1,088	125	38	34	31	4	1	2	1	2	2	9	2	...	...	...	...	...	...	...	...	...	...	...	...	16·08
5b.	Balla, sissoo, and khair ...	5	7	2	4	...	...	...	...	...	...	...	...	...	...	71	14	6	9	...	13	2	...	..	...	...	5·74
5c.	Balla savannah	...	...	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6·88
5d.	Panbaree sâl...	380	259	224	90	10	...	...	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	21·80
5e.	Guddadhur savannah ...	4	...	3	3	...	...	...	...	...	...	...	...	...	...	9	1	...	...	...	1	...	...	...	...	...	17·20
5	Total ...	1,477	391	268	133	42	4	1	3	3	3	2	9	2	...	80	15	6	9	...	14	2	...	...	...	...	67·70
6	From 29th mile-post on Alipore-Buxa road, due east for 5,760′.																										
6a.	Rajabathkhawur sâl ...	86	12	6	7	3	1	...	...	...	...	...	3	1	...	8	6	5	2	...	36	1	...	...	...	...	13·22
6	Total ...	86	12	6	7	3	1	...	...	...	...	...	3	1	...	8	6	5	2	...	36	1	...	...	...	...	13·22
7	From 19th mile-post on Alipore-Buxa road, due west to Sarokjhora.																										
7a.	Rajabathkhawur sâl ...	692	62	25	26	3	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	9·38
7b.	Deema savannah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8·97
7c.	Poro sâl	1,102	184	122	128	85	6	...	1	2	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	32·54
7	Total ...	1,794	246	147	154	88	6	...	1	2	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	50·89
8	From 21st mile-post on Alipore-Buxa road, due west for 28,660′.																										
8a.	Rajabathkhawur sâl ...	185	71	33	20	2	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	2·98
8b.	Deema savannah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	22·96
8c.	Poro sâl	1,384	304	245	150	71	4	...	4	8	3	9	4	...	...	...	...	...	...	...	...	...	...	...	...	...	39·85
8	Total ...	1,569	375	278	170	73	4	...	4	8	3	9	4	1	...	...	...	...	...	...	...	...	2	...	...	...	65·79
9	From 23rd mile-post on Alipore-Buxa road, due west to Neematee Nuddee																										
9a.	Rajabathkhawur sâl ...	110	47	4	8	9	1	...	...	...	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	4·59
9b.	Deema savannah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12·85
9c.	Deema, sissoo, and khair...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17	8	4	1	...	...	3·44
9d.	Poro sâl	745	321	201	159	55	1	1	2	6	3	3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	25·02
9	Total ...	855	368	205	167	64	2	1	2	6	4	5	1	...	...	...	...	...	...	...	17	8	4	1	...	...	45·90
10	From 25th mile-post on Alipore-Buxa road, due west to Neematee Nuddee																										
10a.	Rajabathkhawur sâl ...	25	10	3	...	...	...	...	...	...	...	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	5·74
10b.	Deema savannah	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5·74
10c.	Deema, sissoo, and khair...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	7	6	...	4	40	30	12	2	...	13·52
10	Total ...	25	10	4	...	...	...	...	...	...	...	2	1	1	...	...	8	7	6	...	4	40	30	12	2	...	25·00
11	From 27th mile-post on Alipore-Buxa road, due west to Neematee Nuddee																										
11a.	Rajabathkhawur sâl ...	467	117	77	25	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11·48
11b.	Deema savannah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	5·44
11c.	Deema, sissoo, and khair...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17	13	7	5	4	123	30	19	28	8	...	11·48
11d.	Raimatong savannah ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	5·44
11e.	Kalajhora, sissoo, and khair	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	5	2	...	1·14
11	Total ...	467	117	77	26	6	...	...	...	...	...	...	...	...	...	18	13	8	5	4	123	32	22	33	10	...	30·98

After leaving the road, the line enters a medium stocked sâl forest mixed with chilownee. After crossing the Nonai the chilownee disappears and the sâl improves. Nearing the Balla the usual strip of mixed sissoo and khair is met with; leaving the Balla the line passes through scrub jungle, but meets the sâl at 13,000′, and which extends to 21,500′. It then enters the maidan, which extends to the Guddadhur.

Passes through an inferior stocked sâl forest mixed with other trees.

Passes through a well-stocked sâl forest; meets, however, but few mature trees. After reaching 3,500′ an open maidan is traversed, reaching over the Deema to 8,400′. It then again meets the sâl, which extends to the Poro.

After running through the sâl for 1,300′, in which few mature trees were met with, the line runs through the open maidan, which extends to 11,300′, where the line enters the sâl, which at first is not so good, but improves after getting into the depth of same. This sâl forest extends to 28,660′.

Runs, after leaving the road, through the sâl for 2,000′, then crosses some cotton and maidan. After crossing the Deema, the line passes through some sissoo, and just touches the edge of the sâl at 12,600′, crosses a great number of nuddees and meets the sâl at 21,850′, which proves a well-stocked forest, very clean, mixed with a few chilownee. The sâl extends to within a few feet of the Neematee Nuddee.

Runs through a very poor sâl forest, mixed with achi, kumbi, laukri, and other trees; the sâl after a short distance entirely disappears, and scrub jungle is met with, extending to 5,500′, after which khair and sissoo are met with, the former gradually disappearing, and a clean sissoo forest presenting itself. This sissoo forest extends to a short distance over the Deema.

Passes through sâl until 5,000′, after which it passes through scrub jungle and enters the khair and sissoo at 6,500′, in which the sissoo predominates.

APPENDIX II.—(*Continued.*)

Statement showing result of Forest Valuation Surveys in the Buxa Plain Reserve.

Number.	Position of Line of Survey.	Trees measured.																										Area of survey in acres.	Remarks.
		Sal.							Chilowuee.							Khair.					Sissoo.					Toon.			
		I.	II.	III.	IV.	V.	VI.	VII.	I.	II.	III.	IV.	V.	VI.	VII.	I.	II.	III.	IV.	V.	I.	II.	III.	IV.	V.	III.			
		Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Between 5 and 6 cubits.	Between 6 and 7 cubits.	Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Between 5 and 6 cubits.	Between 6 and 7 cubits.	Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Under 1 cubit.	Between 1 and 2 cubits.	Between 2 and 3 cubits.	Between 3 and 4 cubits.	Between 4 and 5 cubits.	Between 2 and 3 cubits.			
12	From 29th mile-post on Alipore-Buxa road, due west for 24,400′.																												Passes through sál until 4,000′ is reached, then through scrub jungle to 7,500′ when it reaches the strip of khair and sissoo on the Deema, after crossing which a fairly stocked sál forest containing some mature trees is met with; some very fine chilownee are to be found within the proximity of the jhoras.
12*a*.	Rajabathkhawur sál ...	406	118	61	56	11	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9·18	
12*b*.	Deema savannah	...	4	6	8	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8·03	
12*c*.	Deema, sissoo, and khair ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14	19	3	4	...	116	22	5	...	...	...	2·29	
12*d*.	Raimatong sál	247	148	111	91	18	...	...	...	1	2	4	1	...	...	...	...	...	...	...	...	...	...	...	...	...	13·78	
12	Total ...	653	270	178	155	30	1	...	...	3	2	4	1	...	...	14	19	3	4	...	116	22	5	...	...	...	33·28	
13	From point 10,500′ on line No. 12.																												This line was driven (from a point 10,500′ on line No. 12) at an angle of 320° with the north, and runs through the last-mentioned block of sál giving a good result. Some wonderful specimens of chilownee being also met with. This forest extends to 12,500′.
13*a*.	Raimatong sál	754	183	130	111	12	2	...	1	7	4	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	40·17	
13	Total ...	754	183	130	111	12	2	...	1	7	4	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	40·17	

Contents of Sál tracts in the different Blocks.

Sál-trees.	I—Raimatong.	II—Poro.	III—Raja-bathkhawur.	IV—Panbaree.	Total.
Seedlings (under 18″ girth)	78,397	363,444	540,831	423,943	1,406,615
Saplings (between 18″ and 3′ girth)	25,935	90,943	166,252	168,482	451,612
Young trees (between 3′ and 4′ 6″ girth)	18,881	63,879	71,116	105,073	258,949
Trees (between 4′ 6″ and 6′ girth)	15,796	49,087	58,149	55,806	158,840
Old trees (over 6′ in girth)	2,492	24,653	18,839	13,990	59,974
Total ...	141,503	592,006	855,187	767,294	2,335,990

DARJEELING,
The 24th June 1874.

WM. JOHNSTON,
Assistant Conservator of Forests,
Buxa Sub-division.

APPENDIX III.

Working plan of the Buxa Reserve for the years 1875-76 *to* 1882-83, *or list of Compartments to be worked annually in Block III, Rajabathkhawa.*

1	2	3	4	5	6	7	8	
Year.	Compartment.	Sál.	Khair and Sissoo.	Savannah and old cultivation.	Total.	Total Contents of Compartment. Sál-trees. Of 5′ girth and upwards.	Total Contents of Compartment. Sissoo-trees. Of 4′6″ girth and upwards.	Remarks.
1875-76 ...	1	205	63	451	779	747	139	The figures given in columns 7 and 8 show the *total* number of sál and sissoo-trees in the different compartments. As many trees are of inferior quality, and consequently unsaleable, the actual number to be cut and removed will not be much more than half the numbers given in this statement. Differences in the outturn of individual years will be rectified in the sale-depôt, that is to say, by selling annually or periodically an equal number of logs or cubic feet.
	2	305	.....	.....	305	860	.....	
	3	470	49	447	966	1,325	109	
	4	586	63	.....	649	1,053	139	
	5	501	101	386	988	1,413	222	
Total ...		2,127	276	1,284	3,687	5,908	609	
1876-77 ...	6	439	44	.....	483	1,238	97	
	7	374	274	307	955	1,055	603	
	8	562	50	272	884	1,585	110	
	9	283	390	287	960	798	858	
Total ...		1,658	758	866	3,282	4,676	1,668	
1877-78 ...	10	594	40	570	1,204	1,675	88	
	11	392	294	287	973	1,105	646	
	12	738	9	675	1,422	2,081	20	
Total ...		1,724	343	1,532	3,599	4,861	754	
1878-79 ...	13	519	28	375	922	1,464	62	
	14	554	9	795	1,358	1,562	20	
	15	327	90	634	1,051	922	198	
	16	887	.....	569	1,456	2,501	.....	
Total ...		2,287	127	2,373	4,787	6,449	280	
1879-80 ...	17	123	.....	772	894	344	.....	
	18	1,268	.....	389	1,657	3,576	.....	
	19	187	.....	447	634	527	.....	
Total ...		1,577	.....	1,608	3,185	4,447	.....	
1880-81 ...	20	1,565	.....	641	2,206	4,413	.....	
	21	156	.....	439	595	440	.....	
Total ...		1,721	.....	1,080	2,801	4,853	.....	
1881-82 ...	22	1,978	.....	119	2,097	5,578	.....	
	23	250	.....	565	815	705	.....	
Total ...		2,228	.....	684	2,912	6,283	.....	
1882-83 ...	24	2,011	.....	101	2,112	5,672	.....	
	25	.....	.....	320	320	.....	.....	
	26	366	.....	952	1,318	1,032	.....	
Total ...		2,377	.....	1,373	3,750	6,702	.....	
Grand Total ...		15,699	1,504	10,800	27,903	44,270	3,311	

Calcutta,
The 6th August 1875.

W. Schlich,
Conservator of Forests, Bengal.

FINANCIAL DEPARTMENT.

FORESTS.

CALCUTTA, THE 10TH NOVEMBER 1875.

RESOLUTION.

READ—

The Progress Report of Forest Administration in Bengal for the year 1874-75.

THE Report shows that considerable progress was made during the year in the selection and formation of Government forests. At the beginning of the year, owing to the separation of Assam from Bengal, the Bengal Forest Department had been reduced to two divisions, Cooch Behar and Chittagong, and in the latter of these no forest reserves had been formed. The entire reserved area amounted to only 120 square miles in the Cooch Behar division, of which 106 square miles were situated in Darjeeling, and 14 in Julpigoree.

2. The cessation of the famine enabled the Lieutenant-Governor to devote more attention to the development of the Forest Department than he had previously been able to give to the subject, and his efforts for its improvement were effectively seconded by the Conservator and the subordinate officers of the department. The result has been that at the close of the year there were five forest divisions, Darjeeling, Julpigoree, Palamow, the Sunderbuns, and Chittagong; and two more are in course of formation, viz. Sarunda and the Sonthal Pergunnahs. Additions, amounting to 1,347 square miles, were made during the year to the reserved area, bringing up the total to 1,467 square miles. Of these additions, 115 square miles were in Julpigoree, 885 square miles in the Sunderbuns, and 347 square miles in Chittagong. Besides these, 151 square miles of forests in Palamow have been selected as reserves, but were not gazetted as such during the year.

3. No addition was made during the year to the area of the Darjeeling division, the reserved forests remaining as before at 75 square miles in the hill tract, and 31 square miles in the Terai. During the year the Sukna forests, covering an area of 6,902 acres, have been examined and valued. There were still about 15,000 acres unexplored, and these will be examined during the present year. The selection of reserves in the Dumsong sub-district of this division was also commenced during the year, and 40 square miles are ready to be gazetted.

4. In the Julpigoree division two further reserves have been formed, one of five square miles, adjoining the Muraghat sâl forest, and the other of 110 square miles, forming the Buxa plain reserve. The total area of reserves in this division now amounts to 82,511 acres, or 129 square miles. The addition to the Muraghat sâl forest consists chiefly of savannah land, which was included principally with the object of protecting the forest against fires by establishing a river boundary on three sides of it. The Muraghat forest now contains 171,590 sâl trees, principally seedlings and saplings. It is not intended that any cuttings of growing trees shall be made for several years to come, and in the meantime the forest will be protected against fire, grazing, and cultivation.

5. The Buxa plain reserve comprises a tract of almost level country, about 10 miles in breadth by 10½ in length. It includes 74 square miles of sâl forest, six square miles of khari and sissoo, 28 square miles of savannah, and two of cultivated land. The sâl forest is stated by the Conservator to be among the very best in Bengal, the trees being of a fine shape, and attaining large dimensions. Five blocks have been formed for working purposes, and an outline of the working plan for the next eight years is appended to the Report. It is anticipated that the forest will yield at once an annual surplus of Rs. 20,000, which will be greatly increased hereafter.

6. It has been already stated that in the Palamow division the forests, though selected and examined, were not gazetted as reserves during the year. A detailed description and a working plan will appear in next year's Report. The valuation surveys show that the proportion of trees fit for cutting is small, and that the forests will require rest.

7. The formation of a forest reserve in the Sunderbuns was one of the most important operations of the year. The area selected is in the Jessore district, and contains 885 square miles. The most valuable tree in this tract is the soondree *(Heritiera littoralis)*, which is largely used both for boat building and for many purposes of domestic architecture. Although the tree is of rapid growth, the best descriptions have for many years been cut down in so reckless a manner that the western parts of the Sunderbuns have already been exhausted to a large extent, and complaints are made that soondree logs of good quality are becoming scarce in the market. In the reserved tract it is intended that no soondree trees of less girth than three cubits shall be permitted to be cut, and it is hoped that by this means a perennial supply of this valuable timber will be secured. Trees of three cubits girth and upwards will be allowed to be cut on payment of half an anna per maund for the timber, and firewood and other forest produce will be charged for at half the above rate.

8. Since the close of the year it has been found necessary, for the better protection of the soondree forest, to reserve a further area, extending to the line of the sea-coast. This additional tract, however, will be kept as a firewood reserve, in which timber of all kinds may be cut for fuel on payment of the above rate of three pies per maund. It is the wish of the Lieutenant-Governor that in this area every facility should be afforded to the public consistent with the maintenance of future reproduction.

9. The reserved area in the Sunderbuns will, it is expected, yield a considerable revenue; but the object of Government in forming the reserve has not been so much the realization of profit as the preservation, for the public benefit, of a valuable property which was being recklessly destroyed, and which ministered to needs which could not well be supplied from any other quarter. The tract has for the present been placed under the charge of an Assistant Conservator with an establishment of Rs. 430 per month, and four pay-stations have been sanctioned for the collection of moneys due for forest produce.

10. In the Chittagong division, which previously contained only open forests, two reserves were gazetted during the year, the Myanee timber reserve of 339 square miles, and the Kurnafoolee plantation reserve of 8 square miles. The most valuable trees in the Myanee forest are the gurjun and the jarul, but both of these kinds have suffered much from indiscriminate cutting, and are now comparatively scarce. The Kurnafoolee reserve will be planted with teak, jarul, and toon.

11. The Assistant Conservator of Forests in Chittagong has hitherto been under the orders of the Commissioner, who was *ex-officio* Conservator of Forests in the Regulation Districts and Hill Tracts. The formation of reserved areas has rendered it necessary to bring the forests under more systematic management, and the forest officers will in future be under the orders of the Conservator of Forests, Bengal. But besides the reserved areas, in which no jooming or cultivation will be allowed, and which will be entirely under the management of the Forest Department, there will be a class of "district forests," managed by the Deputy Commissioner of the Hill Tracts, and from these forests the people will be permitted to supply themselves with forest produce for their domestic requirements. A proposal is also under consideration to introduce an Act to remove some difficulties in the collection of tolls on forest produce on the Chittagong rivers.

12. On the whole, it may be said that in the Chittagong Division a commencement of forest conservancy, which promises well for the future, has been made during the year. The practice of jooming is one which it is necessary to discourage, but which cannot be at once prohibited; and the people of the Hill Tracts, who have long been accustomed to a free use of forest produce, would feel it a hardship to be deprived of their former privileges. It has been

the object of the Government to frame regulations which shall prevent the wasteful destruction of valuable timber, while avoiding all unnecessary interference with prescriptive rights; and it is believed that this result will be attained by the rules which have been sanctioned.

13. The yield of the forests is noticed at length in the 5th section of the Report. The accounts have been cleared by writing off from the books the timber not actually lying in the sale depôts. In the Darjeeling division 12,704 sleepers were cut and collected for the Northern Bengal State Railway: and a sum of Rs. 18,752 was realized for timber (principally sâl) removed from the forests by private parties. In the Julpigoree division 1,598 pieces of timber were brought to the depôt, and about half of these were disposed of, partly by auction, and partly by private sale. Rs. 5,973 were realized in this division for timber removed by private parties. The stock in hand in both divisions at the close of the year amounted to 16,698 pieces.

14. In the present condition of the department, it is a matter of secondary importance that the operations should be carried on at a profit; but it is nevertheless satisfactory to find that the revenue of the past year considerably exceeded the expenditure. The budget estimate provided for a surplus of Rs. 13,948; but the actual receipts exceeded the estimate by Rs. 64,114, while the expenditure was Rs. 9,168 below the estimate. The total value of the year's transactions was Rs. 1,91,683, and the operations were conducted at a cost of Rs. 1,09,349, thus showing a cash surplus of Rs. 88,334, to which is to be added the difference (Rs. 10,113) between the value of the stock in hand at the commencement and at the close of the year, making the net profit of the year Rs. 92,647. This surplus was obtained entirely in the Darjeeling and Chittagong divisions: in Palamow and the Sunderbuns no revenue has as yet been collected; and in Julpigoree there was a small deficit during the year, though a surplus is expected next year.

15. The Lieutenant-Governor has much pleasure in recognizing the earnest, able, and effective supervision which the Conservator, Dr. Schlich, has given to the Forest Department during the year. He is also glad to observe that the services of the subordinate officers of the department are favourably noticed by the Conservator.

By order of the Lieutenant-Governor of Bengal,

H. J. REYNOLDS,

Offg. Secretary to the Govt. of Bengal.

No. 3750.

COPY, with 20 copies of the report, forwarded to the Conservator of Forests for information.

No. 3751.

COPY, with 400 copies of the report, submitted to the Secretary to the Government of India in the Department of Revenue, Agriculture, and Commerce.

No. 3752.

COPY, with copy of the report, forwarded to the Commissioners of Cooch Behar, Chittagong, Chota Nagpore, Bhagulpore, and the Presidency Divisions. Also to the Collector or Deputy Commissioner of each district of the Cooch Behar, Chota Nagpore, and Chittagong Divisions, and of the Sonthal Pergunnahs.

By order of the Lieutenant-Governor of Bengal,

H. J. REYNOLDS.

Offg. Secy. to the Govt. of Bengal.

CALCUTTA,
The 10th November 1875.

W. H. D'C.—Reg. No. 4580.